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THE

JOURNAL

OF THE

ROYAL AGRICULTURAL SOCIETY

OF ENGLAND.

SECOND SERIES.

VOLUME THE FOURTH.

PRACTICE WITH SCIENCE.

LONDON:

JOHN MURRAY, ALBEMARLE STREET.

1868.

THESE EXPERIMENTS, IT IS TRUE, ARE NOT EASY; STILL THEY ARE IN THE POWER OF EVERY THINKING HUSBANDMAN. HE WHO ACCOMPLISHES BUT ONE, OF HOWEVER LIMITED APPLICATION, AND TAKES CARE TO REPORT IT FAITHFULLY, ADVANCES THE SCIENCE, AND, CONSEQUENTLY, THE PRACTICE OF AGRICULTURE, AND ACQUIRES THEREBY A RIGHT TO THE GRATITUDE OF HIS FELLOWS, AND OF THOSE WHO COME AFTER. TO MAKE MANY SUCH IS BEYOND THE POWER OF MOST INDIVIDUALS, AND CANNOT BE EXPECTED. THE FIRST CARE OF ALL SOCIETIES FORMED FOR THE IMPROVEMENT OF OUR SCIENCE SHOULD BE TO PREPARE THE FORMS OF SUCH EXPERIMENTS, AND TO DISTRIBUTE THE EXECUTION OF THESE AMONG THEIR MEMBERS.

VON THAER, *Principles of Agriculture.*

LONDON: PRINTED BY WILLIAM CLOWES AND SONS, DUKE STREET, STAMFORD STREET, AND CHARING CROSS.

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The Binder is desired to collect together all the Appendix matter, with Roman numeral folios, and place it at the *end* of each volume of the Journal, excepting Titles and Contents, and Statistics, &c., which are in all cases to be placed at the *beginning* of the Volume: the lettering at the back to include a statement of the *year* as well as the *volume;* the first volume belonging to 1839-40, the second to 1841, the third to 1842, the fourth to 1843, and so on.

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VITAL STATISTICS:—POPULATION; BIRTHS; DEATHS; EMIGRATION; METEOROLOGY; IMPORTATIONS OF GRAIN; SALES OF BRITISH WHEAT; PRICES OF CORN, &c.; AND PAUPERISM.

[*The facts are derived chiefly from the Reports of the* REGISTRAR-GENERAL; *the Meteorological Reports of* MR. GLAISHER; *the Returns of the* BOARD OF TRADE, *and the* INSPECTOR-GENERAL OF IMPORTS AND EXPORTS.]

GREAT BRITAIN AND IRELAND, 1867.

IN the middle of the year 1867, the Population of the United Kingdom, as estimated, was 30,157,473; viz., England and Wales, 21,429,508; Scotland, 3,170,769; Ireland, 5,557,196. In the twelve months 1,026,422 births and 634,054 deaths were registered, thus making the natural increase 392,368, or at the rate of 1,074 daily. The recorded number of emigrants was 195,953, or 537 daily. The difference between the emigrants and the registered natural increase was 537 daily.

In the year 1867, 55,494 of the English people, 12,866 of the Scotch, 88,622 of the Irish people, 31,193 foreigners, and 7,778 persons, of origin not distinguished in the returns, left ports of the United Kingdom for foreign and colonial settlements. They constitute a total emigration of 195,953 persons, of whom 159,275 went to the United States. There is a slight decline on some recent years.

ENGLAND AND WALES.

In 1867 the birth-rate in England was 35·84 to a thousand persons living; the death-rate 21·98. The former was above the average, the latter below it.

In districts that comprise the chief towns, the mortality of the year was 23·89 per 1000 of population. In districts comprising small towns and country parishes, 19·55. The average death-rates of town and chiefly rural districts are respectively 24·59 and 20·10 per 1000 living.

The South-Eastern, South-Western and Eastern Counties were the healthiest in 1867; for in these the rate of mortality was only 19 per thousand. In the North-Midland and South-Midland Counties it was 20; in Monmouthshire and Wales and West-Midland Counties, 21; in London, 23; in Yorkshire, 24; in the Northern Counties, 25; in the North-Western (viz., Cheshire and Lancashire), 26.

Typhoid fever broke out at Guildford, Tamworth, Queensbury

near Halifax, in the parishes of Therfield and Guilden Morden, Hertfordshire; the Royal Marine Barracks, East Stonehouse; Terling in Essex, and other places; and in most instances was attributed to foulness of the water or other nuisance.

BIRTHS and DEATHS in 1867 in England.

	Births in 1867.	Annual Birth-rate to 1000 persons living (1867).	Average Birth-rate to 1000 persons living (1857-66).
First Quarter: Jan., Feb., March ..	195,455	37·13	36·63
Second Quarter: April, May, June ..	199,649	37·42	36·19
Third Quarter: July, Aug., Sept. ..	190,255	35·18	33·50
Fourth Quarter: Oct., Nov., Dec. ..	182,638	33·68	33·40
Year	767,997	35·84	34·93

	Deaths in 1867.	Annual Death-rate to 1000 persons living (1867).	Average Death-rate to 1000 persons living (1857-66).
First Quarter: Jan., Feb., March ..	134,254	25·51	25·51
Second Quarter: April, May, June ..	112,523	21·09	22·18
Third Quarter: July, Aug., Sept. ..	108,462	20·06	20·31
Fourth Quarter: Oct., Nov., Dec. ..	115,863	21·37	22·24
Year	471,102	21·98	22·55

A summary review of the national registers for the last quarter of 1867 furnishes proof of a favourable state of the public health viewed in comparison with that of former seasons; but there are exceptional facts that cannot be regarded with like complacency; for it is impossible that the elements of nature, however happily blended to constitute a fine autumn, can successfully contend with human ignorance and neglect, can suddenly counteract poisonous emanations from drains and from marsh lands covered with hovels, or sweeten well-water that has been contaminated with sewage. It is found that in different situations there were outbreaks of fever which the local officers attribute to overcrowding, bad drainage, or otherwise defective sanitary condition; they were not confined to towns, but occurred equally in the purer atmosphere of the country. Such outbreaks are at all times numerous enough, and if they were all reported would probably be found more numerous still. They occur in the secluded hamlets of thinly-peopled districts, where inspectors of nuisances are unknown; where the doctor, when summoned, is too busy with his patients to explore their surrounding conditions; and where, as fevers may be prevalent without being fatal, it is obvious that even an intelligent registrar

living at a distance, it may be, of some miles, has but imperfect means of acquainting himself with authenticated facts. Epidemic disease is rapid in its origin and progress; the art of sanitation, as applied by public bodies, is slow and often difficult. What may be done with the present consent of all, and the prospect of certain benefit in the end, is the wide diffusion of sanitary knowledge among all classes, not excepting the rich. People must be taught to protect themselves. If wells in the neighbourhood of drains are fraught with danger, the fact should be made familiar to all: and if there be a simple and ready means of detecting pollution in water, that too should be universally known, Short and easy lessons on the physical forces, on animal and vegetable physiology, on health and longevity, should be interspersed, in elementary school books, with sketches in natural history, narratives of adventure, and other more attractive matter.

METEOROLOGY.

Third Quarter (July, August, September). The cold period which set in on 3rd June continued throughout July, and extended to 7th August; during this time the weather was very unsettled; the amount of cloud was great; there was very little sunshine; and during the first week in August the temperature was unseasonably cold, some of the nights frosty. From the beginning of the quarter to 7th August the deficiency of temperature was more than 3° daily on the average. From 8th of August to the end of the quarter the weather was better; about the middle of August there were a few days of hot weather, but generally the temperature was little in excess above the average, and frequently for two or three days together was below it. For the fifty-four days ending 30th September the average excess of temperature was $1\frac{3}{4}$° daily.

Vegetation at the end of July was in a backward state, and the crops in many localities had sustained considerable damage from heavy rain. On Thursday night, 25th July, heavy rain began to fall all over the south of England, and continued almost uninterruptedly next day; the amount registered varied from $1\frac{1}{2}$ inch to $3\frac{3}{4}$ inches, being the heaviest rain-fall in the space of a day ever known to the observer. The crops were extensively laid. The Thames and its tributaries overflowed their banks; and in other parts the rivers flooded the neighbouring land, inundating the crops in some places. The harvest prospect at the end of July was unpromising; in the most forward south-eastern districts a partial corn reaping had begun.

In August the crops greatly improved by the fine weather in the

middle of the month, and little rain fell in England, but it fell almost daily in Scotland, sometimes heavily, where the crops were extensively laid and continued quite green. At the end of the quarter the harvest in England was nearly completed, and also in Ireland, but in Scotland about one-third of the crops remained uncut.

The hay crop was one of the heaviest and best secured for many years. The potato crop was large in bulk, but the disease much complained of, particularly in Scotland.

Wheat was first cut on the 5th July at Silloth; on the 23rd at Worthing; on the 30th at Eastbourne; and on the 31st at Taunton. On the 2nd August at Oxford; on the 3rd at Guernsey and Cardington; on the 9th at Helston; on the 12th at Boston and Knebworth; on the 20th at Hull; on the 24th at North Shields; and on the 26th at Ripon.

Oats were first cut on the 15th July at Hull; and on the 22nd at Taunton. On the 12th August at Eastbourne, Boston, and Knebworth; on the 21st at Ripon; on the 24th at Hull; on the 26th at Cardington; on the 28th at North Shields; and on the 31st at Guernsey.

Barley was first cut on the 20th July at Hull; and on the 29th at Helston. On the 5th August at Knebworth; on the 12th at Boston; on the 14th at Cardington and Hull; on the 23rd at North Shields; on the 24th at Eastbourne; on the 26th at Ripon; and on the 31st at Guernsey.

Fourth Quarter (*October*, *November*, *December*).—The weather was cold, with much fog from the 1st to the 13th October. From the latter day the weather was warm everywhere for five days, and rain fell daily; during the rest of the month the weather was generally mild with frequent rain and dampness of the atmosphere. In November the temperature was sometimes above but chiefly below the average; the month was one of the finest Novembers that have ever been known, with little fog, and with less rain than has fallen in that month for fifty years. A sudden change occurred in the first week of December. Rain, hail, sleet, and snow fell in various parts, and a hurricane caused great destruction by sea and land. On the 11th the frost vanished, and for seven days the weather was very warm, and afterwards till the close of the year it was changeable, with clouds and fogs, and much rain all over the country. The mean temperature at Greenwich was below the average in each of the three months: that of the quarter was 42°·5, which is 2°·5 below the average of the same period in twenty-six years. The rainfall was 4°·5 inches, which is 2°·6 inches below

METEOROLOGICAL OBSERVATIONS RECORDED AT THE ROYAL OBSERVATORY, GREENWICH, IN THE LAST SIX MONTHS OF THE YEAR 1867.

1867. Months.	Temperature of Air. Mean.	Air. Diff. from average of 96 years.	Air. Diff. from average of 26 years.	Evaporation. Mean.	Evaporation. Diff. from average of 26 years.	Dew Point. Mean.	Dew Point. Diff. from average of 26 years.	Air—Daily Range. Mean.	Air—Daily Range. Diff. from average of 26 years.	Water of the Thames.	Elastic Force of Vapour. Mean.	Elastic Force of Vapour. Diff. from average of 26 years.	Weight of Vapour in a Cubic Foot of Air. Mean.	Weight of Vapour. Diff. from average of 26 years.
	°	°	°	°	°	°	°	°	°	°	in.	in.	grs.	gr.
July	59·4	−2·0	−2·3	55·3	−2·0	51·7	−2·0	20·3	−0·6	63·1	·384	−·029	4·3	−0·3
August ..	62·0	+1·3	+0·8	58·5	+1·2	55·5	+1·8	19·9	+0·3	63·5	·441	+·024	4·9	+0·3
September ..	57·6	+1·1	+0·5	54·5	+0·5	51·6	+0·5	17·7	−0·8	60·0	·382	+·001	4·3	+0·1
Mean ..	59·7	+0·1	−0·3	56·1	−0·1	52·9	+0·1	19·3	−0·4	62·2	·402	−·001	4·5	0·0
	°	°	°	°	°	°	°	°	°	°	in.	in.	grs.	gr.
October ..	48·7	−1·0	−1·9	47·0	−1·6	45·2	−1·2	15·2	+0·6	50·3	·302	−·015	3·4	−0·3
November ..	41·4	−1·0	−2·6	39·7	−2·0	37·5	−2·4	12·5	+0·8	43·9	·225	−·027	2·6	−0·2
December ..	37·5	−1·6	−3·0	36·2	−2·8	34·4	−2·8	10·1	+0·5	37·3	·199	−·025	2·3	−0·3
Mean ..	42·5	−1·2	−2·5	41·0	−2·1	39·0	−2·1	12·6	+0·6	43·8	·242	−·022	2·8	−0·3

NOTE.—It is understood that the sign *plus* (+) signifies excess, and *minus* (−) defect; and that the figures, to which these symbols are prefixed, indicate the amounts by which the values in the preceding column are in excess or defect.

Meteorological Observations recorded at the Royal Observatory, Greenwich, in the Last Six Months of the Year 1867.

1867. Months.	Degree of Humidity.		Reading of Barometer.		Weight of a Cubic Foot of Air.		Rain.		Daily Horizontal movement of the Air.	Reading of Thermometer on Grass.				
										Number of Nights it was				
	Mean.	Diff. from average of 26 years.	Mean.	Diff. from average of 26 years.	Mean.	Diff. from average of 26 years.	Amount.	Diff. from average of 52 years.		At or below 30°.	Between 30° and 40°.	Above 40°.	Lowest Reading at Night.	Highest Reading at Night.
			in.	in.	grs.	grs.	in.	in.	Miles.				°	°
July . ..	76	0	29·730	−0·072	530	− 2	5·8	+3·2	250	0	5	26	37·4	57·2
August ..	80	+ 3	29·829	+0·044	528	− 1	2·6	+0·2	199	0	1	30	34·1	58·6
September ..	81	0	29·915	+0·097	535	− 1	2·9	+0·5	267	0	7	23	33·1	60·0
							Sum	Sum	Mean	Sum	Sum	Sum	Lowest	Highest
Mean ..	79	+ 1	29·825	+0·023	531	− 1	11·3	+3·9	239	0	13	79	33·1	60·0
			in.	in.	grs.	grs.	in.	in.	Miles				°	°
October ..	88	+ 1	29·758	+0·063	542	+ 3	2·1	−0·7	255	8	12	11	21·6	53·2
November ..	87	− 1	30·119	+0·370	557	+10	0·4	−2·0	241	19	10	1	21·8	48·0
December ..	89	+ 1	29·854	+0·024	556	+ 4	2·0	+0·1	290	23	5	3	15·0	46·2
							Sum	Sum	Mean	Sum	Sum	Sum	Lowest	Highest
Mean ..	88	0	29·910	+0·152	552	+ 6	4·5	−2·6	262	50	27	15	15·0	53·2

Note.—It is understood that the sign *plus* (+) signifies excess, and *minus* (−) defect; and that the figures, to which these symbols are prefixed, indicate the amounts by which the values in the preceding column are in excess or defect.

the average. It was in defect in October, defective by 2 inches in November, and slightly in excess in December.

At the beginning of October the outstanding portions of the crops in the Scottish uplands, and the late districts of England, Scotland, and Ireland, were small, and the gathering was frequently interrupted by rain. The most reliable reports at the close of the harvest estimated the oat crop as the best of the season, and barley as the next in order for bulk, but showing considerable variation both in quantity and weight. The wheat crop was also very varied; some proved to be of good quality, but, taken as a whole, it was below the average. Beans were a good average, but there was a small crop of peas. Potatoes were a large crop, but disease was spoken of in different places.

The fine weather in November, in which month the barometrical readings were remarkably high, enabled a great deal of field work to be done all over the country, and a great breadth of land was sown. In December the stormy weather stopped all out-door farming work for some time. At the end of the year the accounts of the growing wheat crop were generally favourable all over the country. Upon the whole, the quarter was favourable for agricultural purposes.

CORN: Importations, Sales, and Prices.

Quantities of Wheat, Wheatmeal and Flour, Barley, Oats, Peas and Beans, Imported into the United Kingdom in the Year 1867; and in each of the last Six Months of the Year 1867.

1867.	Wheat.	Wheatmeal and Flour.	Barley.	Oats.	Peas.	Beans.
	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.
In first Six Months	14,448,556	1,823,072	3,336,476	4,281,150	743,118	996,006
July ..	3,295,622	233,449	331,684	1,379,365	270,569	91,037
August ..	3,287,469	211,011	280,391	952,093	137,657	143,939
September	3,067,662	156,040	396,908	716,478	29,541	251,057
October ..	2,874,854	227,352	463,368	473,656	40,400	213,944
November	3,903,760	389,426	506,300	875,279	60,661	160,602
December	3,767,646	552,619	368,594	729,115	304,183	126,030
In last Six Months	20,197,013	1,769,897	2,347,245	5,125,986	843,011	986,609
Year ..	34,645,569	3,592,969	5,683,721	9,407,136	1,586,129	1,982,615

Note.—The average weights *per quarter* of corn, as adopted in the office of the Inspector-General of Imports and Exports, are as follows:—For wheat, 485¼ lbs., or 4¼ cwts.; for barley, 400 lbs., or 3½ cwts.; for oats, 308 lbs., or 2¾ cwts. Corn has been entered and charged with duty by *weight* instead of *measure* since September 1864.

QUANTITIES of WHEAT, BARLEY, OATS, PEAS, BEANS, INDIAN CORN or MAIZE, WHEATMEAL and FLOUR, IMPORTED in the THREE YEARS 1865-6-7; also the COUNTRIES from which the WHEAT, WHEATMEAL, and FLOUR were obtained.

	1865.	1866.	1867.
Wheat from—	cwts.	cwts.	cwts.
Russia	8,093,879	8,937,199	14,025,236
Denmark	641,273	506,236	418,012
Prussia	5,403,914	4,401,409	5,572,263
Schleswig, Holstein, and Lauenburg	254,159	187,938	127,222
Mecklenburg	647,685	733,571	651,884
Hanse Towns	486,069	878,912	700,935
France	2,252,873	3,473,130	597,405
Turkey and Wallachia and Moldavia	574,185	528,433	2,446,638
Egypt	10,063	33,831	1,451,774
United States	1,177,618	635,239	4,188,013
British North America	306,765	8789	683,127
Other countries	1,114,480	2,831,642	3,783,060
Total Wheat	20,962,963	23,156,329	34,645,569
Barley	7,818,404	8,433,863	5,683,721
Oats	7,714,230	8,844,586	9,407,136
Peas	783,135	1,211,835	1,586,129
Beans	958,362	1,324,173	1,982,615
Indian Corn, or Maize	7,096,033	14,322,863	8,540,429
Wheatmeal and Flour from—			
Hanse Towns	247,796	347,012	444,710
France	3,044,823	3,640,320	1,234,742
United States	256,769	280,792	722,976
British North America	177,353	40,650	121,503
Other countries	177,730	663,506	1,069,038
Total Wheatmeal and Flour	3,904,471	4,972,280	3,592,969

COMPUTED REAL VALUE of CORN IMPORTED in the ELEVEN MONTHS (ended NOVEMBER 30th) of 1867.

The value of wheat imported in eleven months was 22,102,884*l.*, which is almost double the value of the quantity imported in the same period of 1866, and considerably more than double the value in the same period of 1865, when it was less than nine millions.

The value of wheat-meal and flour was 2,940,918*l.*, which exceeds the value imported in the eleven months of 1865, and is less than that of 1866.

The value of barley imported in eleven months of 1867 was 2,643,325*l.*, against 2,236,109*l.* in 1865, and 3,062,156*l.* in 1866.

The value of oats was 3,963,933*l.*, against 2,466,955*l.* in 1865, and 3,251,657*l.* in 1866.

QUANTITIES of BRITISH WHEAT SOLD in the Towns from which Returns are received under the Act of the 27th and 28th VICTORIA, cap. 87, and their AVERAGE PRICES, in each of the last SIX MONTHS of the Years 1862-67.

	WHEAT: QUANTITIES IN QUARTERS.					
	1862.	1863.	1864.	1865.	1866.	1867.
	quarters.	quarters.	quarters.	quarters.	quarters.	quarters.
Seventh month	163,720	162,817	257,510	222,961	127,836	109,829
Eighth month	138,810	187,011	264,939	201,953	191,057	102,303
Ninth month (five weeks)	264,410	390,308	322,292	318,893	325,056	265,668
Tenth month ..	273,000	333,609	311,169	304,054	320,674	349,788
Eleventh month	265,160	325,209	302,446	295,632	284,530	265,622
Twelfth month (five weeks)	315,599	472,876	399,358	391,941	332,934	301,558

	WHEAT: AVERAGE PRICES PER QUARTER.											
	1862.		1863.		1864.		1865.		1866.		1867.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Seventh month	57	0	46	7	42	0	42	10	54	1	65	1
Eighth month	57	8	46	2	43	7	43	3	50	7	68	0
Ninth month (five weeks)	56	1	44	6	42	0	44	0	49	0	63	5
Tenth month ..	49	5	40	10	38	9	41	10	52	4	66	7
Eleventh month	49	0	39	11	38	10	45	7	56	6	69	9
Twelfth month (five weeks)	46	8	40	9	38	3	46	8	60	3	67	7

AVERAGE PRICES of BRITISH WHEAT, BARLEY, and OATS per Quarter (imperial measure) as received from the INSPECTORS and OFFICERS of EXCISE according to the Act of 27th and 28th VICTORIA, cap. 87, in each of the last TWENTY-SIX WEEKS of the Year 1867.

Week ending	Wheat.		Barley.		Oats.		Week ending	Wheat.		Barley.		Oats.	
	s.	d.	s.	d.	s.	d.		s.	d.	s.	d.	s.	d.
July 6	64	11	35	3	27	1	Oct. 5 ..	63	5	40	3	25	9
July 13 ..	64	7	34	9	28	5	Oct. 12 ..	64	10	40	5	25	3
July 20 ..	65	1	35	1	28	4	Oct. 19 ..	67	6	41	8	25	10
July 27 ..	65	8	35	8	28	3	Oct. 26 ..	70	5	42	9	26	0
Aug. 3 ..	67	5	35	3	27	6	Nov. 2 ..	69	11	43	6	26	4
Aug. 10 ..	68	2	35	11	28	9	Nov. 9 ..	70	1	43	0	26	1
Aug. 17 ..	68	4	36	7	29	7	Nov. 16 ..	70	1	42	7	26	1
Aug. 24 ..	68	2	39	4	28	11	Nov. 23 ..	68	11	41	5	25	8
Aug. 31 ..	66	7	39	6	28	11	Nov. 30 ..	68	5	40	5	25	9
Sept. 7	62	5	38	10	27	6	Dec. 7 ..	68	1	40	2	25	9
Sept. 14 ..	61	3	39	9	27	3	Dec. 14 ..	67	3	40	8	25	5
Sept. 21 ..	62	11	40	7	27	0	Dec. 21 ..	66	9	41	2	24	4
Sept. 28 ..	64	1	40	6	26	1	Dec. 28 ..	67	4	41	9	25	3
Average of Summer Quarter	65	4	37	6	28	0	Average of Autumn Quarter	67	11	41	6	25	8

The Average Prices of Consols, of Wheat, of Meat, and of Potatoes; also the Average Number of Paupers relieved on the *last day* of each Week; and the Mean Temperature, in each of the Twelve Quarters ending December 31st, 1867.

Quarters ending	Average Prices.					Pauperism.		Mean Temperature.
	Consols (for Money).	Wheat per Quarter in England and Wales.	Meat per lb. at Leadenhall and Newgate Markets (by the Carcase).		Best Potatoes per Ton at Waterside Market, Southwark.	Quarterly Average of the Number of Paupers relieved on the *last day* of each week.		
			Beef.	Mutton.		In-door.	Out-door.	
1865	£.	s. d.						°
Mar. 31	89⅜	38 4	4½*d.*—7*d.* Mean 5¾*d.*	5¼*d*—7¼*d.* Mean 6¼*d.*	85*s.*—97*s.* Mean 91*s.*	142,329	813,371	36·5
June 30	90⅝	40 6	4¾*d.*—6¾*d.* Mean 5¾*d.*	6¼*d.*—8½*d.* Mean 7⅜*d.*	90*s.*—115*s.* Mean 102*s.* 6*d.*	125,846	776,016	56·2
Sept. 30	89⅝	43 3	4½*d.*—7*d.* Mean 5¾*d.*	6¼*d.*—8¾*d.* Mean 7½*d.*	65*s.*—100*s.* Mean 85*s.*	117,172	719,589	62·5
Dec. 31	88⅛	44 10	4¼*d.*—7*d.* Mean 5⅝*d.*	5½*d.*—8¼*d.* Mean 6⅞*d.*	60*s.*—90*s.* Mean 75*s.*	129,036	725,259	46·0
1866								
Mar. 31	87	45 6	4½*d.*—6¾*d.* Mean 5⅝*d.*	5½*d.*—7¾*d.* Mean 6⅝*d.*	55*s.*—90*s.* Mean 72*s.* 6*d.*	139,546	759,402	41·2
June 30	86⅛	46 6	4¾*d.*—7*d.* Mean 5⅞*d.*	5½*d.*—8½*d.* Mean 7*d.*	60*s.*—95*s.* Mean 77*s.* 6*d.*	123,657	734,139	53·0
Sept. 30	88⅜	51 0	5¼*d.*—7¼*d.* Mean 6⅛*d.*	5¼*d.*—8¼*d.* Mean 6¾*d.*	75*s.*—120*s.* Mean 97*s.* 6*d.*	120,955	717,553	58·9
Dec. 31	89⅛	56 8	4¾*d.*—7*d.* Mean 5⅞*d.*	5¼*d.*—7½*d.* Mean 6⅜*d.*	85*s.*—130*s.* Mean 107*s.* 6*d.*	133,979	734,312	46·2
1867								
Mar. 31	90⅞	60 7	4¾*d.*—7*d.* Mean 5⅞*d.*	5*d.*—7¼*d.* Mean 6⅛*d.*	115*s.*—160*s.* Mean 137*s.* 6*d.*	147,620	832,364	38·9
June 30	92⅛	64 0	4¾*d.*—6¾*d.* Mean 5¾*d.*	5¼*d.*—7¼*d.* Mean 6¼*d.*	135*s.*—175*s.* Mean 155*s.*	134,678	779,629	53·5
Sept. 30	94⅜	65 4	4¾*d.*—6¾*d.* Mean 5¾*d.*	5*d.*—7*d.* Mean 6*d.*	100*s.*—155*s.* Mean 127*s.* 6*d.*	129,838	743,977	59·7
Dec. 31	94⅜	67 11	4½*d.*—6¾*d.* Mean 5⅝*d.*	4½*d.*—6½*d.* Mean 5½*d.*	110*s.*—155*s.* Mean 132*s.* 6*d.*	146,237	771,230	42·5

Average Prices of British Wheat, Barley, and Oats, per Imperial Quarter, in each of the Sixteen Years 1852-67.

Year.	Wheat.	Barley.	Oats.	Year.	Wheat.	Barley.	Oats.
	s. d.	s. d.	s. d.		s. d.	s. d.	s. d.
1852	40 9	28 6	19 1	1860	53 3	36 7	24 5
1853	53 3	33 2	21 0	1861	55 4	36 1	23 9
1854	72 5	36 0	27 11	1862	55 5	35 1	22 7
1855	74 8	34 9	27 5	1863	44 9	33 11	21 2
1856	69 2	41 1	25 2	1864	40 2	29 11	20 1
1857	56 4	42 1	25 0	1865	41 10	29 9	21 10
1858	44 2	34 8	24 6	1866	49 11	37 5	24 7
1859	43 9	33 6	23 2	1867	64 6	40 0	26 1

VITAL STATISTICS:—POPULATION; BIRTHS; DEATHS; EMIGRATION; METEOROLOGY; IMPORTATIONS OF GRAIN; SALES OF BRITISH WHEAT; PRICES OF CORN, &c.; AND PAUPERISM.

[*The facts are derived chiefly from the Reports of the* REGISTRAR-GENERAL; *the Meteorological Reports of* Mr. GLAISHER; *the Returns of the* BOARD OF TRADE, *and the* INSPECTOR-GENERAL OF IMPORTS AND EXPORTS.]

POPULATION of the UNITED KINGDOM (exclusive of islands in the British seas); also of ENGLAND, SCOTLAND, and IRELAND; estimated to the middle of the year 1868:—

UNITED KINGDOM IN 1868.

Males	14,628,472
Females	15,741,373
Total	30,369,845

	England.	Scotland.	Ireland.
Males	10,456,743	1,503,766	2,667,963
Females	11,192,634	1,684,359	2,864,380
Total ..	21,649,377	3,188,125	5,532,343

ENGLAND AND WALES.

BIRTHS and DEATHS in the First Six Months of 1868.

Winter Quarter (*January, February, March*).—Births registered were 198,594. The annual* birth-rate was 3·694 per cent.; the average derived from ten corresponding winters of 1858-67 being 3·674.

Deaths registered were 120,095. The annual* death-rate was 2·234 per cent.; the average derived from ten corresponding winters of 1858-67 being 2·576.

The fine weather of the quarter, in which period February was remarkably vernal in its character, exercised the most salutary influence on the public health; and a singularly low rate of mor-

* The *annual* birth-rate or death-rate of a quarter represents the proportion which the births or deaths in a quarter, after they have been multiplied by 4, bear to the population. There were more than three births to 100 living; nearly 37 to 1000.

tality was the result. There are only two instances, since the commencement of the national registration, in which the winter death-rate was so low as it was in the early months of 1868. In the winter of 1846 it was 2·157 per cent.; in 1856 it was 2·179. In 1850 and 1857 it was respectively 2·261 and 2·298. In the remaining twenty-six seasons it ranged from 2·350 per cent. to 2·910.

The returns both of town and country testified to the higher condition of health enjoyed by their inhabitants. In the large town districts the rate of mortality was 2·403 per cent., the average being 2·761. In districts that comprise small towns, villages, and open country it was 2·012, the average being 2·350. It is a subject for congratulation that at a time when commerce was depressed, provisions dear, and the resources on which the working classes depend for food and warmth were in many parts straitened or destroyed, the rigours of an inclement winter were not added to their other privations.

From ports in the United Kingdom there went in the quarter 25,986 emigrants, of whom 7926 were persons of English origin, 1917 were Scotch, 12,132 were Irish, and 4011 foreigners. Of the total emigration 23,528 persons, half of whom were of Irish birth, embarked for the United States; 57 for British North America; 1319 for the Australian colonies.

Spring Quarter (April, May, June).—Births registered were 202,892. The annual birth-rate was 3·764 per cent.; the average of ten springs (1858-67) being 3·637.

Deaths registered were 109,984. The annual death-rate was 2·040 per cent.; the average of ten springs (1858-67) being 2·220.

This is the lowest death-rate that has occurred in the spring season within the 30 years experience of the national registration. The influence of the weather, which continued unusually fine, appears to have been more decidedly favourable in country than in town; for the death-rate in the chief towns was 2·220 per cent. against an average of 2·353; while in the small towns and rural districts it was 1·804, the average being 2·057. The mortality of Manchester was 2·766; that of Sheffield, 2·634; and of Liverpool, 2·576 per cent. In Birmingham the rate was 2·066, and was rather lower than that of London.

The total number of emigrants in the quarter (ended 30th June) was 82,068. Of these, 18,759 were of English origin, who, with the exception of about 5000, went to the United States. Of the 28,829 Irish who emigrated, a still larger proportion, namely 26,262, were bound to the same destination. Of the total emigration about 67,000 persons went to the United States, about 11,000 to British

North America, 3,000 to the Australian colonies. About a third part of the emigrants were foreigners.

METEOROLOGY.

Winter Quarter (*January, February, March*).—At Greenwich the weather was cold during the first 11 days of the year; and the deficiency of daily temperature averaged 6½°. The wind was from north-east; on the 12th it changed to south-west, and the temperature rose above the average, and continued for the most part above it till the end of the quarter. The average excess of temperature in the 80 days ending the 31st March was rather more than 3½° daily. Gales of extraordinary violence were experienced in January.

February was remarkably warm. There were less than the average of east winds and compounds of east winds in February and March. The weather in the former month was more like spring than winter; it caused vegetation to progress rapidly, and at the end of the month trees and shrubs were budding, and the accounts respecting winter-sown wheat were favourable.

March, though less settled than February, was still favourable to agricultural operations; good progress was made in ploughing, sowing, and planting.

At the end of the quarter vegetation was in advance of ordinary seasons, and the prospects of harvest were favourable.

From observations collected from nearly 60 meteorological stations, it appears that the highest temperatures of the air were at Ensleigh (Lansdowne, Bath) 67°·0; Lampeter, 66°·2; Marlborough College, 66°·0; Osborne, 65°·7; Leeds and Bywell, 63°·0; and Nottingham, 62°·6. The lowest temperatures of the air were at Lampeter, 14°·4; Truro, 17°·0; Allenheads, 18°·0; Aldershot, 19°·4; Ensleigh, 19°·5; Nottingham, 19°·6; and Marlborough and Streatley Vicarage, 19°·8. The greatest daily ranges were at Osborne, 16°·6; Wilton, 16°·0; Bywell, 13°·9; Nottingham, 13°·8; Marlborough, 13°·7; Strathfield Turgiss, 13°·6; and Ensleigh, 13°.4. The least daily ranges were at Halifax, 6°·3; Culloden, 7°·3; Guernsey, 7°·6; Otley, 7°·9; Cockermouth and Silloth, 9°·0; and Grantham, 9°·1. The greatest numbers of rainy days were at Allenheads, 77; Stonyhurst, 68; Clifton and Eccles, 63; Miltown, 62; Truro, 61; and Barnstaple and Royston, 60. The least numbers of rainy days were at Ensleigh, 36; Norwich, 37; Osborne, Worthing, and Gloucester, 38; and Wisbech, 39. The heaviest falls of rain were at Allenheads, 19·1 in.; Cockermouth, 18·5 in.; Stonyhurst,

A 5

14·6 in.; Lampeter, 13·8 in.; Truro, 12·1 in.; Silloth, 11·9 in.; Culloden, 11·6 in.; and Barnstaple, 11·5 in. The least falls of rain were at Worthing and Wisbech, 3·9 in.; York and Ripon, 4·3 in.; North Shields, 4·9 in.; and Grantham and Leeds, 5·2 in.

Spring Quarter (April, May, June).—At Greenwich the weather during the whole quarter was remarkably fine and warm; the temperature was almost constantly over the average, exceptions being few in number and small in amount. The average daily excess of temperature for the 91 days ending 30th of June was 3°·1, and for 171 days (from January 12th to June 30th) was more than 3¼° in excess.

April was warm (48°·1), but not in a remarkable degree, for since the year 1771 there have been twenty-four Aprils of higher mean temperature.

May was of higher temperature than any since the year 1848, when the mean was 59°·7, or 2°·4 warmer than in this year; the next and only other instance back to 1771 was in 1833, when the mean temperature of May was 59°·4. The mean temperatures of all other Mays were less than 57°. That of last May was 57°·3.

June was of high temperature (62°·0), but this was greatly exceeded in the year 1846, when it was 65°·3, or 3°·3 warmer; the other instances of higher temperature in June back to the year 1771 were in 1842, 1822, 1818, 1781, and 1775. The highest was 62°·9 in 1842 and 1818, the lowest 62°·5 in 1781.

The mean temperature of the three months ending June was 55°·8; for the same period in 1775 it was 55°·5; in 1822 was 55°·0; in 1844 was 55°·1; in 1846 was 55°·7; in 1848 was 55°·3; and in 1865 was 56°·2; the only instance in 98 years of higher temperature in the corresponding quarter than that of the present year, was in 1865. In the latter year the temperature in April was 52°·3, being higher than that of any other April on record.

The other years since 1771, when the mean temperature of the three months ending with June exceeded 54° and was less than 55°, were 1778, 1779, 1788, 1798, 1811, 1826, 1833, 1834, and 1858.

The five months from February 1st to June 30th:—The mean temperature of this period for 1868 was 50°·9, the mean temperatures of the corresponding period of other years distinguished by high temperature, were as follows:—In the year 1775 it was 50°·0; in 1779 was 51°·1; in 1794 was 49°·4; in 1822 was 51°·1; in 1826 was 49°·5; in 1846 was 50°·8; in 1848 was 50°·6; and in 1859 it was 50°·1. The mean temperature of these five months for all the other years since 1771 was less than 50°·0. In two instances therefore, viz., the years 1779 and 1822, have these five months been of

higher temperature than in 1868, and in both by so small an amount only as the one-fifth part of a degree; but if we compare the mean temperature of the 171 days ending 30th June with the corresponding period of other years, we find that the year 1822 is the only one distinguished by an excess of temperature over the present year.

These same five months have been further distinguished by having an almost constant atmospheric pressure above the average; the mean monthly excess of pressure was more than 0°·1 inch. They have also been distinguished by a deficiency of rain in each month, with the exception of April; the amount below the average in the five months ending June 30th was 2°·5 inches; but reckoning from 1st January the fall of rain is very nearly the true fall for the period, the deficiency being only 0°·1 inch. The period from 1st January has been distinguished by an unusual distribution of rain; in January it fell to the depth of 4·2 inches, being an excess for that month of 2·4 inches. The drought which was experienced towards the end of the quarter is not attributable, therefore, to a deficiency of rain since the beginning of the year up to the end of June, but to its unequal distribution over these months, there having been a great excess in January and a great deficiency in June, together with an unusual evaporation caused by continued high temperatures, extending over a period of five months.

The highest temperature at Greenwich occurred on 19th June, when it was 87°, and on 13th and 14th June, when it was 85°. These temperatures were exceeded at some places in the Midland Counties.

It is very remarkable that notwithstanding the continuance of high temperatures, only one thunderstorm occurred at Greenwich during the quarter, that on the 29th of May, on which day the greater part of the rain for that month fell; and generally over the country there have been much less than the usual number of thunderstorms.

For agricultural purposes the month of April was favourable, and at its end there was every prospect of an early and plentiful harvest.

May was remarkable for brilliant sunshine, high temperature, the general forwardness of the season, and the promising appearance of the cereal crops.

June was favourable to the ripening of the wheat crops, but injurious to grass lands, and to all spring and root crops.

The hay crop was housed in good condition at an unusually small expense; the quality is good, but the bulk is stated to be small.

In the quarter ending 30*th June*, the highest temperatures of the air were at Wilton and Leeds, 91°·0, Royston, 89°·8; Weybridge Heath and Wakefield, 89°·0; and Boston, 88°8. The lowest temperatures of

METEOROLOGICAL OBSERVATIONS MADE AT THE ROYAL OBSERVATORY, GREENWICH, IN THE FIRST SIX MONTHS OF THE YEAR 1868.

1868. MONTHS.	Temperature of										Elastic Force of Vapour.		Weight of Vapour in a Cubic Foot of Air.	
	Air.			Evaporation.		Dew Point.		Air—Daily Range.		Water of the Thames.				
	Mean.	Diff. from average of 97 years.	Diff. from average of 27 years.	Mean.	Diff. from average of 27 years.	Mean.	Diff. from average of 27 years.	Mean.	Diff. from average of 27 years.		Mean.	Diff. from average of 27 years.	Mean.	Diff. from average of 27 years.
	°	°	°	°	°	°	°	°	°	°	in.	in.	grs.	gr.
January ..	37·2	+1·0	−0·9	35·6	−1·3	33·4	−1·5	8·6	−1·2	37·7	·191	−·011	2·2	−0·2
February ..	43·0	+4·6	+4·1	40·4	+3·1	37·3	+2·5	13·1	+1·7	41·5	·223	+·019	2·6	+0·2
March ..	44·0	+3·1	+2·5	41·4	+2·2	38·3	+2·0	16·1	+1·6	45·8	·231	+·016	2·7	+0·2
Mean ..	41·4	+2·9	+1·9	39·1	+1·3	36·3	+1·0	12·6	+0·7	41·7	·215	+·008	2·5	+0·1
	°	°	°	°	°	°	°	°	°	°	in.	in.	grs.	gr.
April	48·1	+2·2	+1·2	44·9	+1·1	41·4	+0·9	18·7	+0·3	49·2	·261	+·009	3·0	+0·1
May	57·3	+4·8	+4·4	53·0	+3·8	49·0	+3·5	24·4	+4·1	58·6	·348	+·046	3·9	+0·5
June	62·0	+3·9	+2·9	56·3	+1·6	51·4	+0·6	25·5	+4·6	64·0	·379	+·006	4·2	0·0
Mean ..	55·8	+3·6	+2·8	51·4	+2·2	47·1	+1·7	22·9	+3·0	57·3	·329	+·020	3·7	+0·2

NOTE.—It is understood that the sign *plus* (+) signifies excess, and *minus* (−) defect; and that the figures, to which these symbols are prefixed, indicate the amounts by which the values in the preceding column are in excess or defect.

Meteorological Observations made at the Royal Observatory, Greenwich, *in the* First Six Months of the Year 1868.

1868. Months.	Degree of Humidity.		Reading of Barometer.		Weight of a Cubic Foot of Air.		Rain.		Daily Horizontal movement of the Air.	Reading of Thermometer on Grass.				
										Number of Nights it was			Lowest Reading at Night.	Highest Reading at Night.
	Mean.	Diff. from average of 27 years.	Mean.	Diff. from average of 27 years.	Mean.	Diff. from average of 27 years.	Amount.	Diff. from average of 53 years.		At or below 30°.	Between 30° and 40°.	Above 40°.		
			in.	in.	grs.	grs.	in.	in.	Miles.				°	°
January ..	86	− 2	29·741	−0·005	555	+ 1	4·2	+2·4	366	16	12	3	15·0	42·6
February ..	80	− 5	29·969	+0·176	553	0	1·3	−0·3	360	12	15	2	23·9	42·0
March ..	80	− 2	29·824	+0·081	549	− 1	1·1	−0·5	353	14	12	5	21·0	44·2
							Sum	Sum	Mean	Sum	Sum	Sum	Lowest	Highest
Mean ..	82	− 3	29·845	+0·084	552	0	6·6	+1·6	360	42	39	10	15·0	44·2
			in.	in.	grs.	grs.	in.	in.	Miles				°	°
April	78	− 1	29·782	+0·019	543	0	2·1	+0·4	297	6	18	6	20·0	45·7
May	74	− 2	29·845	+0·071	534	− 8	1·7	−0·5	230	0	16	15	33·0	50·6
June	68	− 6	29·980	+0·179	531	0	0·5	−1·5	211	0	6	24	35·5	53·0
							Sum	Sum	Mean	Sum	Sum	Sum	Lowest	Highest
Mean ..	73	− 3	29·869	+0·090	536	− 3	4·3	−1·6	246	6	40	45	20·0	53·0

Note.—It is understood that the sign *plus* (+) signifies excess, and *minus* (−) defect; and that the figures, to which these symbols are prefixed, indicate the amounts by which the values in the preceding column are in excess or defect.

the air were at Marlborough College, 19°·4; Wilton, 21°·5; Streatley Vicarage, 22°·6; and Strathfield Turgiss, Wakefield, Hull, and Ripon, 23°·0. The greatest daily ranges were at Wilton, 27°·1; Strathfield Turgiss, 25°·3; Lampeter, 24°·9; Streatley Vicarage, 24°·8; Weybridge Heath, 24°·7; Royston, 24°·1; and Cardington, 24°·0. The least daily ranges were at Guernsey, 10°·8; Culloden, 10°·9; Hawarden, 13°·7; Worthing, 13°·8; Otley, 14°·2; North Shields, 14°·4; Helston, 15°·2; and Cockermouth, 15°·6. The greatest numbers of rainy days were at Stonyhurst, 53; Allenheads and Culloden, 51; Cockermouth, 38; Silloth and Miltown, 37; and Eccles, Liverpool, and Bywell, 36. The least numbers of rainy days were at North Shields, 11; Cardington, 18; Gloucester, 20; and Osborne, Strathfield Turgiss, Royal Observatory, Battersea, Wisbech, and Holkham, 21. The heaviest falls of rain were at Cockermouth, 7·6 in.; Silloth, 6·5 in.; Allenheads, 6·0 in.; Guernsey and Truro, 5·8 in.; and Bournemouth and Carlisle, 5·5 in. The least falls of rain were at Llandudno, 2·0 in.; Royston and Wisbech, 2·4 in.; and Grantham, Boston, and Leeds, 2·6 in.

Mr. Herbert J. Little, of Thorpelands, Northampton, writes as follows (see 'Times,' 29th July):—

"It seems to be a commonly received opinion that no year so dry as the present has occurred since 1826. This is not so. Both 1863 and 1864 had less rainfall to the end of July than we have already had this year, as the table underneath will show:—

	1863.	1864.	1868.
	Inches.	Inches.	Inches.
January	1·716	·705	3·085
February	·289	1·200	1·715
March	·735	2·585	1·850
April	·940	·545	1·390
May	·825	1·702	·760
June	2·940	·940	·510
July	·740	·475	·130
	8·185	8·152	9·440

"That the present drought is much more severely felt than either of those mentioned above is certain, and for this reason—that the rainfall in both those years came opportunely for the crops, and especially was this the case in 1863. In that year four months of the spring—viz., February, March, April, and May—only gave 2·789 in. of rainfull, but a 'dripping June' proved the truth of the old adage, and gave us one of the finest harvests of the present century.

"In 1864 grass was nearly as much burnt up, but the corn crops were saved by the rains of May and a cool June, with nearly double the rainfall of the same month this year.

"Now, according to Mr. Symons's tables in the 'Times' of

the 27th inst., the rainfall of 1826 far exceeded that of either of the three years mentioned, amounting for the four months, April, May, June, and July, to 7·63 in., and yet that year is remembered all over the country as '.the hottest and driest ever known,' and old farmers assure me that nothing like it has been known since then until the present. The reason for this must be sought, then, not in the amount of rainfall, but in the excessive heat, in the absence of cloud, in the wonderful dryness of the atmosphere, and in the consequent excessive evaporation. A glance at Mr. Symons's tables will show that in respect to temperature, June of 1826 was two degrees higher than June of 1868, and that July of 1868 will exceed the corresponding month of 1826.

"One word about the crops. There is an opinion prevalent that wheat does not want rain, and to a certain extent it is true. No doubt there are many very fine crops of wheat this year, and on deep rich clays and loams they are probably unsurpassed; but I cannot think that taking the country through, light and heavy land together, the yield will come near that of 1863, when the wheat crop, after being strengthened and stiffened and braced up by the spring drought, was fed by the copious showers of June almost to its full capability. Barley has, much of it, never come into ear at all, and will probably not exceed half a crop in many important districts. Oats are nearly as bad. Beans almost totally destroyed by fly, and green crops a total failure."

CORN: Importations, Sales, and Prices.

Quantities of Wheat, Wheatmeal and Flour, Barley, Oats, Peas and Beans, Imported into the United Kingdom in each of the First Six Months of the Year 1868.

1868.	Wheat.	Wheatmeal and Flour.	Barley.	Oats.	Peas.	Beans.
	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.
January ..	2,724,152	255,898	227,181	404,567	171,308	128,345
February	2,283,426	253,311	332,038	98,669	34,722	136,415
March ..	3,457,943	264,158	728,979	750,332	13,278	213,547
April ..	3,095,369	248,368	508,233	746,027	33,002	145,952
May ..	3,219,849	198,678	367,593	534,893	42,668	168,064
June ..	2,915,764	206,409	422,505	951,504	101,823	305,368
Total in Six Months.	17,696,503	1,427,022	2,586,529	3,486,392	396,801	1,097,691

Note.—The average weights *per quarter* of corn, as adopted in the office of the Inspector-General of Imports and Exports, are as follows:—For wheat, 485⅓ lbs., or 4⅓ cwts.; for barley, 400 lbs., or 34/7 cwts.; for oats, 308 lbs., or 2¾ cwts. Corn has been entered and charged with duty by *weight* instead of *measure* since September 1864.

Quantities of Wheat, Barley, Oats, Peas, Beans, Indian Corn or Maize, Wheatmeal and Flour, Imported in the Six Months ended 30th of June in the Three Years 1866-7-8; also the Countries from which the Wheat, Wheatmeal, and Flour were obtained.

	1866.	1867.	1868.
Wheat from—	cwts.	cwts.	cwts.
Russia	3,649,398	5,147,296	4,489,880
Denmark	148,615	305,412	249,385
Prussia	1,663,193	3,532,054	2,213,473
Schleswig, Holstein, and Lauenburg	73,507	83,599	32,270
Mecklenburg	302,225	498,343	371,446
Hanse Towns	315,701	432,281	382,837
France	2,683,389	418,793	12,984
Illyria, Croatia and Dalmatia	1,157,006	239,976	615,861
Turkey and Wallachia and Moldavia	295,973	1,338,159	1,915,656
Egypt	7,012	48,505	2,294,011
United States	315,160	1,071,512	3,817,082
Chili	12,000	857,047	442,342
British North America	8,789	87	154,376
Other countries	876,708	475,492	704,900
Total Wheat	11,508,676	14,448,556	17,696,503
Barley	3,954,929	3,336,476	2,586,529
Oats	3,490,490	4,281,150	3,486,392
Peas	542,637	743,118	396,801
Beans	244,376	996,006	1,097,691
Indian Corn, or Maize	6,151,931	4,563,553	4,913,715
Wheatmeal and Flour from—			
Hanse Towns	130,352	238,053	281,407
France	2,713,046	882,613	227,498
United States	164,735	106,272	338,092
British North America	6,142	6,584	64,126
Other countries	120,209	589,550	515,899
Total Wheatmeal and Flour	3,134,484	1,823,072	1,427,022

Computed Real Value of Corn Imported into the United Kingdom in the Three Years, 1865-6-7.

	1865.	1866.	1867.
	£.	£.	£.
Wheat	9,775,616	12,983,090	24,985,096
Barley	2,524,668	3,745,944	2,832,515
Oats	2,771,133	3,632,385	4,319,908
Maize	2,234,396	4,530,503	3,834,734
Other kinds	791,249	1,321,069	1,778,954
Wheat Flour	2,622,888	3,796,911	3,519,577
Other kinds of Flour	4,165	36,082	93,350
Total of Corn	20,724,115	30,045,984	41,364,134

QUANTITIES of BRITISH WHEAT SOLD in the Towns from which Returns are received under the Act of the 27th and 28th VICTORIA, cap. 87, and their AVERAGE PRICES, in each of the First SIX MONTHS of the Years 1863-68.

	QUANTITIES IN QUARTERS.					
	1863.	1864.	1865.	1866.	1867.	1868.
	quarters.	quarters.	quarters.	quarters.	quarters.	quarters.
First month ..	262,923	344,930	300,816	212,713	221,791	193,077
Second month	239,882	306,713	298,271	259,999	203,900	201,325
Third month (five weeks)	281,405	350,974	373,069	331,295	280,878	235,402
Fourth month	243,552	285,286	261,501	250,159	205,231	173,120
Fifth month ..	267,587	284,601	327,694	250,890	221,067	162,030
Sixth month .. (five weeks)	302,897	333,201	283,528	245,393	196,985	128,142

	AVERAGE PRICES PER QUARTER.					
	1863.	1864.	1865.	1866.	1867.	1868.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
First month ..	47 5	40 7	38 6	45 10	61 5	70 4
Second month	47 3	40 8	38 3	45 7	60 11	72 11
Third month (five weeks)	45 8	40 1	38 6	45 4	59 9	73 1
Fourth month	45 7	40 0	39 8	44 10	61 7	73 4
Fifth month ..	46 4	39 2	41 0	46 3	64 8	74 3
Sixth month .. (five weeks)	46 8	39 8	41 5	48 3	65 5	68 9

AVERAGE PRICES of BRITISH WHEAT, BARLEY, and OATS per Quarter (Imperial Measure) as received from the INSPECTORS and OFFICERS of EXCISE according to the Act of 27th and 28th VICTORIA, cap. 87, in each of the First TWENTY-SIX WEEKS of the Year 1868.

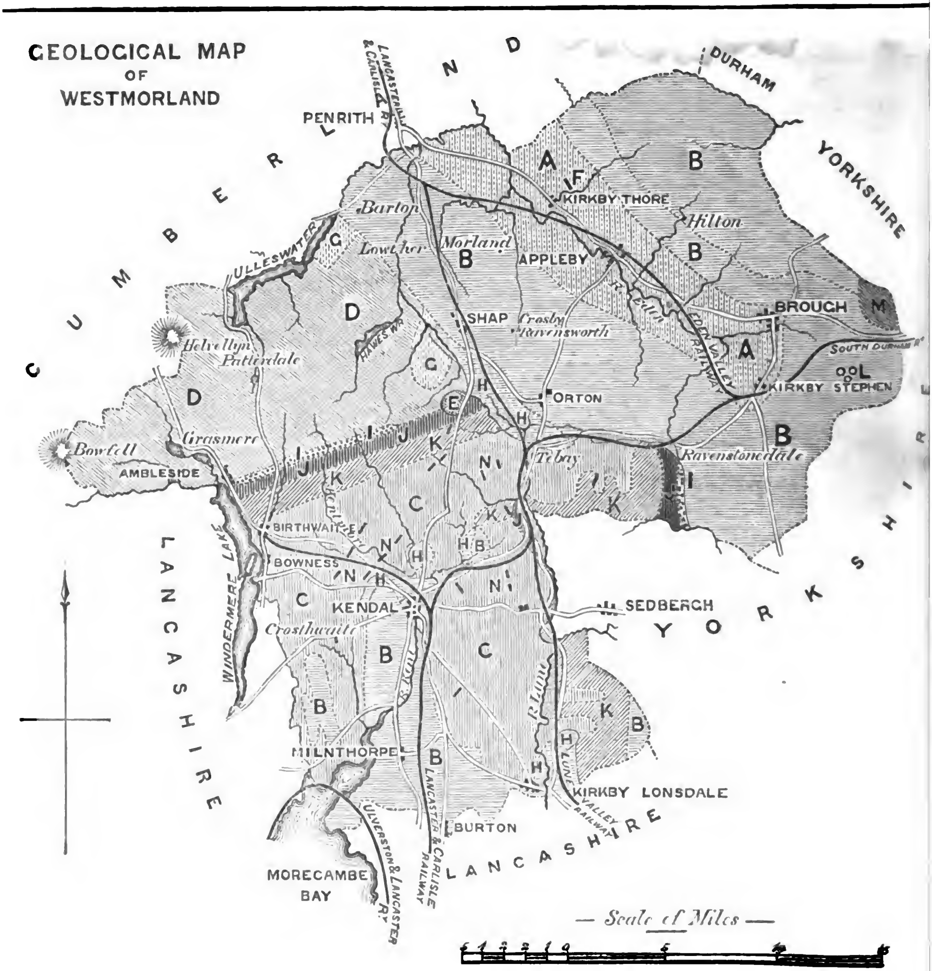
Week ending	Wheat.	Barley.	Oats.	Week ending	Wheat.	Barley.	Oats.
	s. d.	s. d.	s. d.		s. d.	s. d.	s. d.
January 4 ..	67 10	41 4	25 10	April 4 ..	72 6	43 4	27 2
January 11..	69 6	41 6	25 5	April 11 ..	73 2	43 6	27 8
January 18..	71 6	42 1	25 7	April 18 ..	73 8	43 10	29 0
January 25..	72 4	42 6	25 6	April 25 ..	73 11	45 2	28 2
February 1..	72 6	42 4	25 11	May 2 ..	74 2	44 2	28 3
February 8..	73 4	42 7	26 0	May 9 ..	74 7	43 8	28 4
February 15	73 0	42 5	25 9	May 16 ..	74 3	44 4	28 8
February 22	72 11	42 9	26 2	May 23 ..	73 10	43 1	29 9
February 29	73 4	42 5	26 9	May 30 ..	72 3	43 3	29 6
March 7 ..	73 8	43 1	27 2	June 6 ..	70 8	40 10	29 10
March 14 ..	73 1	43 3	27 2	June 13 ..	67 6	42 2	30 4
March 21 ..	72 5	43 4	26 9	June 20 ..	66 1	39 2	29 3
March 28 ..	72 10	43 3	27 5	June 27 ..	67 5	39 1	30 0
Thirteen weeks.	72 2	42 6	26 3	Thirteen weeks.	71 10	42 9	28 11

The AVERAGE PRICES of Consols, of Wheat, of Meat, and of Potatoes; also the AVERAGE NUMBER of PAUPERS relieved on the *last day* of each Week; and the MEAN TEMPERATURE, in each of the Fourteen Quarters ending June 30th, 1868.

Quarters ending	AVERAGE PRICES.					PAUPERISM.		Mean Tempe-rature.
	Consols (for Money).	Wheat per Quarter in England and Wales.	Meat, per lb. at Leadenhall and Newgate Markets (by the Carcase).		Best Potatoes per Ton at Waterside Market, Southwark.	Quarterly Average of the Number of Paupers relieved on the *last day* of each week.		
			Beef.	Mutton.		In-door.	Out-door.	
1865	£.	s. d.						°
Mar. 31	89⅜	38 4	4½*d.*—7*d.* Mean 5¾*d.*	5¼*d*—7¼*d.* Mean 6¼*d.*	85*s.*—97*s.* Mean 91*s.*	142,329	813,371	36·5
June 30	90⅝	40 6	4¾*d.*—6¾*d.* Mean 5¾*d.*	6¼*d.*—8½*d.* Mean 7⅜*d.*	90*s.*—115*s.* Mean 102*s.* 6*d.*	125,846	776,016	56·2
Sept. 30	89⅝	43 3	4½*d.*—7*d.* Mean 5¾*d.*	6¼*d.*—8¾*d.* Mean 7½*d.*	65*s.*—100*s.* Mean 85*s.*	117,172	719,589	62·5
Dec. 31	88⅛	44 10	4¼*d.*—7*d.* Mean 5⅝*d.*	5½*d.*—8¼*d.* Mean 6⅞*d.*	60*s.*—90*s.* Mean 75*s.*	129,036	725,259	46·0
1866								
Mar. 31	87	45 6	4½*d.*—6¾*d.* Mean 5⅝*d.*	5½*d.*—7¾*d.* Mean 6⅝*d.*	55*s.*—90*s.* Mean 72*s.* 6*d.*	139,546	759,402	41·2
June 30	86⅛	46 6	4¾*d.*—7*d.* Mean 5⅞*d.*	5½*d.*—8½*d.* Mean 7*d.*	60*s.*—95*s.* Mean 77*s.* 6*d.*	123,657	734,139	53·0
Sept. 30	88⅜	51 0	5¼*d.*—7¼*d.* Mean 6⅛*d.*	5½*d.*—8¼*d.* Mean 6¾*d.*	75*s.*—120*s.* Mean 97*s.* 6*d.*	120,955	717,553	58·9
Dec. 31	89⅛	56 8	4¾*d.*—7*d.* Mean 5⅞*d.*	5¼*d.*—7½*d.* Mean 6⅜*d.*	85*s.*—130*s.* Mean 107*s.* 6*d.*	133,979	734,312	46·2
1867								
Mar. 31	90⅞	60 7	4¾*d.*—7*d.* Mean 5⅞*d.*	5*d.*—7¼*d.* Mean 6⅛*d.*	115*s.*—160*s.* Mean 137*s.* 6*d.*	147,620	832,364	38·9
June 30	92⅛	64 0	4¾*d.*—6¾*d.* Mean 5¾*d.*	5¼*d.*—7¼*d.* Mean 6¼*d.*	135*s.*—175*s.* Mean 155*s.*	134,678	779,629	53·5
Sept. 30	94⅛	65 4	4¾*d.*—6¾*d.* Mean 5¾*d.*	5*d.*—7*d.* Mean 6*d.*	100*s.*—155*s.* Mean 127*s.* 6*d.*	129,838	743,977	59·7
Dec. 31	94⅜	67 11	4½*d.*—6⅜*d.* Mean 5⅜*d.*	4½*d.*—6¼*d.* Mean 5½*d.*	110*s.*—155*s.* Mean 132*s.* 6*d.*	146,237	771,230	42·5
1868								
Mar. 31	93	72 2	4¼*d.*—6½*d.* Mean 5⅜*d.*	4¼*d.*—6½*d.* Mean 5⅜*d.*	125*s*—170*s.* Mean 147*s.* 6*d.*	159,716	860,165	41·4
June 30	94⅝	71 10	4½*d.*—6¾*d.* Mean 5⅝*d.*	4¾*d.*—7*d.* Mean 5⅞*d.*	130*s.*—170*s.* Mean 150*s.*	142,588	800,944	55·8

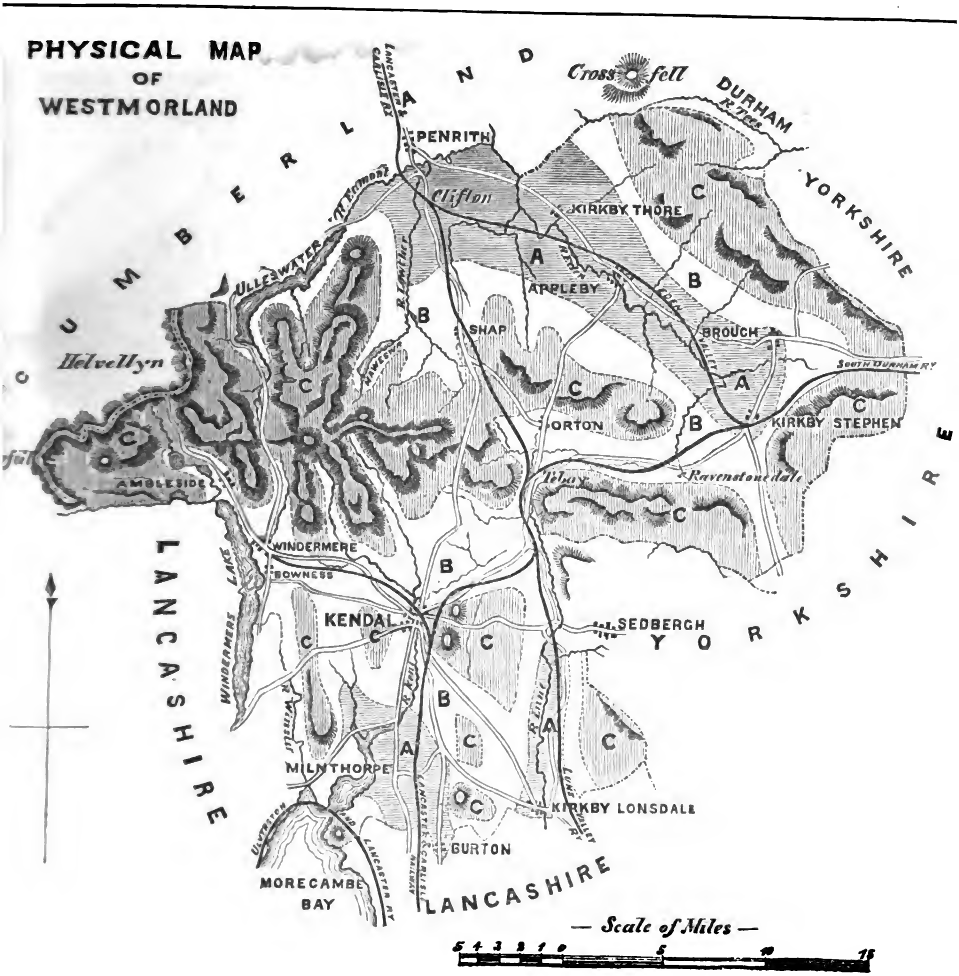
PAUPERISM.

The TOTAL number of paupers relieved on the 1st January, 1868, in 655 unions and single parishes under Boards of Guardians, in England and Wales, was 1,040,952, of whom 163,080 were in-door paupers, 877,872 were out-door. The total gives a proportion of 1 pauper to every 19 persons in the population of those unions and parishes, as returned at the census of 1861, or a proportion equal to 5·2 per cent. The number of insane poor was 42,927. On the 1st Jan., 1867, the number of adult able-bodied paupers was 158,308; on the 1st Jan., 1868, it was 185,630, exhibiting an increase of 27,322, or 17·3 per cent.



INDEX TO STRATA

A New Red Sandstone.	**H** Old Red Sandstone.
B Mountain Limestone.	**J** Brathay Flags.
C Hayfell and Kirkby-moor Slates.	**I** Coniston Limestone.
D Green Slates and Porphyry.	**K** Coniston Grits.
E Granite.	**L** Coal Measures.
F Gypsum.	**M** Millstone Grits.
G Skiddaw Slate.	**N** Porphyry or Synetic Dykes.



A Land where Wheat is grown.

B Meadow and Pasture Lands.

C Fell Pastures and Commons.

JOURNAL

OF THE

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

I.—*On the Farming of Westmorland.* By Crayston Webster, Land Agent and Surveyor, Kendal.

Prize Essay.

Westmorland is bounded on the east by Yorkshire and Durham, west and north by Cumberland, and south by Lancashire. Its greatest length, measuring from Morecambe Bay to the Tees at Tyne Head, is 41¼ miles, and its greatest breadth, from Bow Fell to Stainmore, 40½ miles. It comprises 3 poor-law unions and 32 parishes, subdivided for rating purposes into 109 townships, and about 165 highway districts.

Its population was in	1801	40,805
" "	1811	45,922
" "	1821	51,359
" "	1831	55,041
" "	1841	56,454
" "	1851	58,287
" "	1861	60,810

These figures show a slow rate of increase compared with other counties. Between 1851 and 1861 there was a considerable decrease in some of the purely agricultural parishes, while a considerable influx has been and is going on towards the Windermere and Lake district. Westmorland is the thinnest populated county in England, the number of inhabitants per square mile being only 80, while the average of England is 373.

In 1851 there were enumerated 2333 farmers; agricultural outdoor labourers, 2404; indoor farm-servants, 1957. The total number employed in manufactures of all kinds was stated at 1933. The same returns indicated a remarkable extent of migration from the county to towns, besides emigration. There were then living in England, but out of the county, 23,068 persons born in it, and of these 1233 were in London. In 1861 there were 11,810 inhabited houses, 597 empty, and 75 building.

The area of the county has usually of late been estimated at 485,432 acres. In 1793 the late Bishop Watson attempted an estimate by the primitive mode of cutting out and weighing a piece of Jeffery's map, and so made it 540,160 acres; but by computation by scale from the same map, only 407,040 acres. The following summary is believed to be correct.

Parishes.	Fells and Commons.	Hill Pastures.	Woods.	Roads.	Railways.	Lakes, Tarns, and Rivers.	Total.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Appleby St. Lawrence	..	120	310	73	..	56	6,058
Appleby St. Michael ..	7,416	1,600	350	88	52	103	15,521
Asby	3,077	1,400	100	44	..	12	8,497
Askham	2,011	250	100	24	..	23	4,484
Bampton	6,748	300	100	31	..	234	10,925
Barton	18,695	3,500	850	73	15	1558	31,805
Beetham	401	1,000	2,150	150	31	74	13,627
Brough	11,311	2,000	550	105	35	50	21,646
Brougham	..	..	650	57	24	55	6,226
Burton	..	1,500	460	112	15	32	7,634
Cliburn	..	..	140	26	..	36	1,890
Clifton..	..	..	50	35	48	13	1,781
Crosby Garrett	1,794	600	70	43	10	25	5,108
Crosby Ravensworth	6,913	2,750	480	124	26	39	17,962
Dufton	12,368	1,750	130	14	..	92	16,848
Grasmere	12,022	4,000	1,350	90	..	487	24,352
Great Musgrave.. ..	..	1,500	80	24	10	14	3,190
Heversham	..	1,750	1,050	309	40	119	18,804
Kendal	5,900	18,000	3,500	672	215	556	74,061
Kirkby Lonsdale ..	4,493	8,000	1,600	336	100	405	35,945
Kirkby Stephen ..	14,440	4,000	400	189	80	126	33,033
Kirkby Thore	4,972	1,150	200	78	11	49	11,700
Long Marton	2,097	500	170	72	..	20	6,947
Lowther	..	..	300	38	20	31	3,674
Morland	..	650	1,030	181	24	76	16,012
Newbiggin	..	200	50	13	..	3	1,196
Ormside	..	..	180	49	..	26	2,713
Orton	9,300	2,500	230	177	73	127	24,515
Ravenstondale	9,562	750	90	70	17	39	16,407
Shap	9,601	8,500	150	114	56	310	27,177
Warcop	3,904	1,150	220	92	30	40	11,490
Windermere	..	5,000	1,580	152	15	3688	19,676
	147,025	74,420	18,670	3655	947	8518	500,904

The total gross estimated rental of the county, as fixed by the Assessment Committees, is about 455,330*l.*, of which 61,927*l.* is due to railways. The average rental per acre of the land (excluding towns, railways, &c.) is about 14*s.* 6*d.* per acre, and of the ancient inclosed lands, commons excluded, as nearly as possible 20*s.* per acre.

The writer has been at some pains to ascertain the proportions

of the above areas cultivated and otherwise, and believes the following table to be near the truth:—

	Acres.		Per cent of the whole county.
Land under corn crops in 1865	22,130	=	4·42
,, green crops ,, ...	11,191	=	2·23
,, bare fallow ,, ...	2,105	=	0·41
,, artificial grasses under rotation	18,519	=	3·69
Total arable, taken from Government Returns	53,945	=	10,75
Permanent pasture, meadow, and ancient inclosures	159,931	=	31·93
Rough pastures and low allotments	33,793	=	6·74
Hill pastures and high allotments	74,420	=	14·85
Fells and commons, uninclosed	147,025	=	29·35
Woods and plantations	18,670	=	3·75
Roads	3,655	=	0·73
Railways	947	=	0·19
Lakes, tarns, rivers, and ponds	8,518	=	1·71
	500,904	=	100·00

Out of the 22,130 acres under corn-crop, no less than 17,042 acres were oats. These figures plainly indicate that Westmorland is not an arable district, only about one-tenth of the gross area being under the plough. Nearly one-third of its surface is yet uninclosed; commons remaining in 20 out of 32 parishes.

In March, 1866, the county possessed 55,328 head of cattle, being 91 for every 100 of population, and 11·4 to every 100 acres of area, the average of England being respectively 10·2 and 17·4. There were of sheep 224,664; being 46·3 to every 100 acres, or just about the average of England.

The county is essentially mountainous, yet it contains many fertile and smiling valleys, with the charming lakes of Windermere, Ulleswater, Grasmere, Rydal, &c. The climate, though humid, is very salubrious, the mortality of the whole county in 1866 being only eighteen in the thousand; that of one district being only 14·3. The lake district attracts permanent residents in increasing numbers, notwithstanding its pluvial notoriety.

The great Pennine chain, stretching from Cross Fell to Stainmore, guards the county on the east; the giant ramparts of the Lake mountains, "the mighty Helvellyn," Bow Fell, &c., on the west. The northern parts dip into the fertile vale of Eden, and the southern extremity is washed by salt water in Morecambe Bay. The county is cut in two across its centre from east to west by what may be called a backbone of mountains and high ground, stretching from the head of Grasmere by Shap Fell, Ash Fell, &c., to the Pennine chain. It is pierced by several passes, such as Raise Gap, Kirkstone, Shap, &c. The waters north of this ridge run into the Eden and Solway Frith, those south of it into Morecambe Bay.

This great natural division asserts itself in various ways, remarkable in so small a county. The vernacular of the common people on either side of it is different; that on the north approaches the Cumberland and Border tongue, while that on the south may be called the pure Westmorland dialect, quite different from that of Lancashire. The modes of farm management, farming customs, times of entry on farms, weights and measures of grain, the soils, and general features, are more or less distinct, while the rainfall is something like 40 per cent. less on the north than on the south side of the line.

The county is pretty well supplied by railways, which appear to intersect 21 out of 32 parishes. The Lancaster and Carlisle, now part of the great London and North-Western system, pierces the county through its centre from south to north, scaling the heights of Shap Fell, once thought by George Stephenson to be impracticable for the locomotive; a branch from Kendal taps the lake district at Windermere; another from Low Gill, down the Vale of Lune, links the county with Yorkshire. The South Durham line, from Tebay over Stainmore, affords access to the Durham Coal Fields and the east coast. The "Eden Valley" connects the county town of Appleby with Kirkby Stephen and Penrith. The Ulverston and Lancaster Railway, crossing the upper part of Morecambe Bay, cuts through a nook of the county at Arnside.

The outlay on highways is about 4000*l.* a year, but they certainly cannot be described as in good order.

The annual cost of out and indoor relief and maintenance of the poor is about 5400*l.* The poor-rates average about 1*s.* 3*d.* in the pound; highway rates, 4*d.*; tithes, 2*s.* per acre. Some of the parishes are tithe free, or nearly so, land having been allotted in lieu thereof on the inclosure of the commons.

The following shows the height in feet of various points above the sea-level:—

	Mountains.	Feet.	Mountain Passes.	Feet.	Towns and Villages.	Feet.	Lakes and Tarns.	Feet.
West	Helvellyn	3118			Kendal Town Hall	171	Windermere	134
	Bow Fell	2960			Kirkby Lonsdale Church	214	Rydal	181
	Langdale Pike	2401	Dunmail Raise	800	Milnthorpe	44	Grasmere	208
Central	High Street	2663	Kirkstone	1467	Orton	750	Easedale	915
	Shap Fells	1937	ShapFellsRoad	1300	Kirkby Stephen	550	Stickle	1540
	Wasdale Pike	1853			Brough	590	Hayes Water	1383
	Orton Scar	1352	Orton Road	1250	Appleby	500	Blea Water	1584
	Wild Boar Fell	2323	Ash Fell	1180	Shap	900	Hawes Water	694
Pennine Chain	Mallerstang Fell	2328			Crosby Ravensworth	700	Ulleswater	477
	Stainmore	1565	Stainmore	1436	High Winder	1000		
	Mickle Fell	2547						
	Murton Pike	1949						
	Cross Fell	2799						

Geology.

Geologically, the county has three main divisions, viz., the Cumbrian Mountain Slate Rocks, the Mountain and Carboniferous Limestone, and the new Red Sandstone. There are numerous minor divisions (see Map).

The north-western part contains green slate and porphyry. Slate quarries are worked in Langdale, Grasmere, and Kentmere. The western mountains run up into some of the highest and most rugged peaks of the lake district. In the south-eastern district are found some of the fossiliferous rocks of Kirkby Moor. In a few places in the vales of Kent and Lune, and near Shap Wells, are small patches of the old red sandstone, on which is invariably found a superior class of fertile soil. The peculiar "Coniston band" of limestone, which, after crossing the country to the west in a straight line, emerges from the bed of Lake Windermere, and runs in a narrow belt across Kentmere, to near Shap Wells—wherever it comes near the surface, affords herbage much sweeter than that on either side.

The mountain limestone is abundant at Kendal, and to the west, the lofty escarpments of Whitbarrow, Farlton Knot, Arnside Knot, and Scout Scar, being formed of it. It occupies much of the central part of the county, as at Orton, Crosby Ravensworth, Shap, Ravenstonedale, and Kirkby Stephen, and on the Pennine chain it is occasionally capped with the mill-stone grit.

On Shap Fell is the granitic peak known as Wasdale Crag, whence boulders have been spread wholesale, by glacial agency probably, over nearly all the county, especially to the north and east. Some have crossed the deep Vale of Eden, and afterwards surmounted the summits of Stainmore, 1000 feet high, and lie stranded on the distant plains of Northern Yorkshire.

The lead-mining at Patterdale and Murton employs altogether about 300 hands. The only coal worked is at Tan Hill on Stainmore, and it is of poor quality; and, though previously to the railways, supplying a considerable district, it is now of small account. The extent of mining in Westmoreland is too small to have any appreciable effect on its agriculture.

Soils.

In many instances the underlying geological formation is, on account of deep deposits of drift, no reliable guide to the qualities of the surface-soil. Very often the most extraordinary variations occur in the soil in short distances, and even in the

same field—very troublesome to the farmer, and puzzling to the valuer.

Westmorland is certainly a *thin-skinned* shallow-soiled county. The soils in the Vales of Kent and Lune are gravelly, here and there intermixed with more loamy patches, well adapted for all kinds of crops, but good feeding old grass-lands are in very small room.

The Vale of Eden is sharp and sandy, in some parts with gritty deposits from the mountains, forming first-class and early turnip and barley soils, and here and there tolerable meadows.

Commencing near Kirkby Stephen, and running westwards by Soulby, Bleatarn, Ormside, Hoff, Colby, Morland, Newby, Strickland, and Clifton, to the Eamont, is a belt of cold ungrateful clay, very profitless to the farmer. All this district is naturally wet; turnips are raised with difficulty, and here the bare fallow for wheat still lingers. This may be reckoned the poorest land in the county, although resting on the limestone formation, which, on the southern side of the county, comprises the best land where there is sufficient depth of soil.

Along the base of the Pennine range is found a continuous belt of first-class grass-land, as at Stainmore, Brough Sowerby, Brough, Hilton, Murton, Dufton, and Milburn. The meadows at Stainmore, although in a high cold climate, produce herbage unsurpassed in the county for aroma and feeding qualities. Similar good meadows are found at Shap, Orton, and Ravenstonedale, and it is always thought good farming to procure natural seeds from those places for laying down arable lands in the lower parishes for permanent grass.

As a general rule, in most of the valleys, the deepest, strongest, and best soil is found near the base of the mountains, often succeeded by a belt of clay or colder land, and, as the river is approached, by deposits of sand and gravel. In many places the substratum for some distance on each side of a river is little more than "shillow," or pebbles, thinly grassed over. The uplands are often cold, inferior land, with a stiff impenetrable subsoil, locally called "sammel"—gravel and clay indurated—and very difficult to drain.

The mountain vales, such as Mallerstang, Long Sleddale, Troutbeck, Grasmere, &c., contain narrow bottoms of productive meadow. Although often grazed by the mountain sheep till late in May, the crops of hay in July are abundant, and grow more rapidly than in lower spots. July, however, being almost invariably a wet month, the hay harvest in these high districts is often a protracted and weary time, and frequently is not over till into September, and occasionally even October.

The various dales, such as Langdale, Patterdale, Hartsop, Troutbeck, Kentmere, Long Sleddale, Martindale, Mardale, Swindale, Wet Sleddale, and Mallerstang, are unique in character. In the centre of the vale is the swift-flowing "babbling brook," with a narrow strip of verdant mead on either side, then succeed the "intack," or fell-side pasture, often fringed with shaggy underwood and bosky dells, vestiges of the primæval forests—above all are the cloud-capped mountains. The inhabitants retain much of the primitive simplicity of their forefathers. On the fells of Martindale there still survives a herd of wild red deer.

Pringle, writing in 1793, describes the then existing system of farming as very primitive indeed. On the best arable lands the course was—1st year, oats; 2nd, barley; 3rd, oats; sometimes two crops of oats before the barley. The land was then left to itself, without any seeds sown, the farmers thinking that quite needless, as the land was so "girse proud." The next year's produce was a thin crop of natural hay, mostly twitch-grass and weeds; the crop used to improve till towards the third year, but then deteriorated, and at seven years the ground was a soft carpet of moss, then came the plough and the above course again.

On the lighter soils about Kendal, a crop of potatoes was taken between the oat crops, followed by barley, and then oats again; turnips were then quite a curiosity, and people would travel miles to see a crop of an acre or two, some pronouncing them a new-fangled and useless fancy.

About the beginning of the present century the high price of grain, caused by the Continental wars, led to the inclosure of many thousands of acres of the lower lying commons. This period is still spoken of by the older farmers as "Bonneypart time," and with many a sigh of regret, when the famous crops and prices then obtained are remembered. Immediately the allotments were set out the plough was stuck in, and a scourging succession of corn-crops, one after another, taken for years. At the same time large and costly buildings were erected, as if such times were to last for ever. The land being "fresh," and generally heavily limed, produced fine crops at first, but after the final struggle of Waterloo, and the collapse of prices, all was left to Dame Nature; it "laid itself down," and a deal of it, as about Newby, Sleagill, Ormside, Bleatarn, Hoff, and many other places, has never been touched since—permanently depreciated, and a monument of folly, much of it on the bare clays being scarcely grassed over after lying half a century. One farm is pointed out as having, when newly inclosed, been let at 300*l.* a-year, now let at only about one-third of that amount.

If instead of being robbed with the plough, these districts had

been drained, limed, and kept in pasture, their present value would have been threefold what it is.

It is noticeable that many decent patches of land on the open commons have been ploughed at some period, and there is scarcely an acre even of the best meadows and pastures that has escaped the plough at some time or other.

One reason of this, in addition to the tempting prices above referred to, was doubtless the defective internal communication, which caused every farmer to grow grain to provide bread for his family, otherwise unobtainable. Till within a comparatively recent period there were no carriage-roads, and all the traffic of the county was carried on by pack-horses. If the traveller looks underneath the present bridges, he will find that most of them have been widened once or twice, the original width being not calculated for carriages. In those times the farmer manufactured much of his own clothing from his own wool, and it is not long since the spinning-wheel disappeared from the farm-houses.

Many of the rural roads go right over the hills in an apparently unaccountable manner. When pack-horses only were in request, a steep hill was not of the consequence it ultimately proved for carriages, and the base of the hill, along which the road might have gone level, was then probably an impassable swamp.

Pringle's report in 1797 says, "A large proportion of the land is occupied by 'estatesmen' of from 10*l.* to 50*l.* a-year, and the farms in general are so small that it is rare to meet with one of 100*l.* rent, though there are some of 200*l.* or 250*l.*"

A wonderful change has since taken place; the old class of "estatesmen" are nearly extinct, although a few remain, principally in the mountain dales. The ancient small tenements, which had descended from father to son for many generations, became burdened with charges to younger members; often the family was too large to be sustained on the limited area, while mortgages and arrears of interest accumulated with fatal celerity; then perhaps came bad seasons, losses in stock, and similar reverses to which the occupier of land is always liable, and so at last the patrimonial estate had to be parted with. The tendency has all along been to render the already large landowners larger still, while the small owners are gradually disappearing.

In the neighbourhood of the Lakes a new class of competitors for the ownership of the soil has arisen in the merchant princes of the manufacturing districts, who eagerly buy up any nook where they may escape from their own smoke, and enjoy pure air and bracing breezes, with shooting and fishing.

As regards farms, the tendency has been and continues in the way of consolidation, by laying two or three small farms into

one. There are now very numerous farms of 200*l.* to 300*l.* a-year rent, and several from 500*l.* to 700*l.*, or upwards. Some of these are very extensive, such as Forest Hall, 4350 acres; Shap Abbey, 2830 acres; Helbeck Hall, 2000 acres; Rydal Demesne, 1900 acres; but these of course include a large proportion of mountain or fell land. A large number of small farms are left, rented at 30*l.* or 50*l.*, and upwards.

Good farms about Kendal, Natland, Heversham, Milnthorpe, Barton, and Kirkby Thore, average from 33*s.* to 42*s.* per acre; dairy-farms near Kendal, 40*s.* to 50*s.* In the immediate vicinity of towns and villages, accommodation fields of old grass let at from 3*l.* to 6*l.* per acre. On the poor clays lying between the central ridge and the Eden, 15*s.* may be an average. Hill-side pastures, capable of summering young stock, from 8*s.* to 16*s.*; higher pastures, 3*s.* 6*d.* to 7*s.* 6*d.*; and fell lands, all the way from 4*d.* to 1*s.* 6*d.* per acre.

The rent of grass and stock farms has increased 20 per cent. within the last 15 years.

In the neighbourhood of Crosthwaite, Lyth, Underbarrow, and Witherslack, a noteworthy feature is the considerable extent of fine orchards, whence large quantities of fruit are sold southwards. In the same neighbourhood are extensive hazel coppices, fruitful of nuts, which, with the orchards, form material ingredients in the value of the farms.

Influence of Climate, &c.

From its physical conformation Westmoreland is not, nor ever can be, an arable county to any extent; but even if it could, other causes, viz., its climate and rainfall, cannot be over-looked, as restricting tillage to a limited area.

The Lake mountains, and the central ridge or "backbone," act as magnets in attracting the rain-clouds, brewed up by the Gulf Stream and neighbouring Irish Channel. These, careering hastily up the steep mountain sides, and there entering a cooler temperature, scatter their contents wholesale on the country beneath, often when not wanted; but on attaining the summit they have usually spent most of their store, before starting a fresh race across the valleys and plains beyond. The prevailing winds are S.W. From these causes the eastern and northern sides of the county have a much less rainfall than the south and west. The writer has often left Kendal by rail, in a gloomy down-pour of rain, and found a fine day an hour afterwards, on getting over the Shap summit.

Few towns in England, perhaps, can, like Kendal, produce a

resident (Mr. Samuel Marshall) who has *personally*, and with unwearied zeal and accuracy, registered the rain-gauge and barometer and thermometer for the long period of forty-five years. The following diagram of the rainfall at Kendal is drawn from his observations, from 1821 to 1866. From 1811 to 1821 the registers were kept by Messrs. Gough and Harrison.

The averages, in decades, are as follows—

			Inches.
	1811 to 1820	inclusive	50·850
	1821 to 1830	"	56·365
	1831 to 1840	"	55·218
	1841 to 1850	"	51·311
	1851 to 1860	"	45·654
6 years—	1861 to 1866	"	53·442

The diagram does not indicate regular wet and dry cycles. The average rainfall appears to be gradually decreasing. Pringle says the fall, in 1792, was 83 inches. The fall at Ambleside, in 1864, was 74·40; in 1865, 65·78; in 1866, 94·10! while that at Appleby, in 1866, was only 39·36, and at Brougham Hall, 44·71. The fall at Appleby for the last ten years averaged 33 inches.

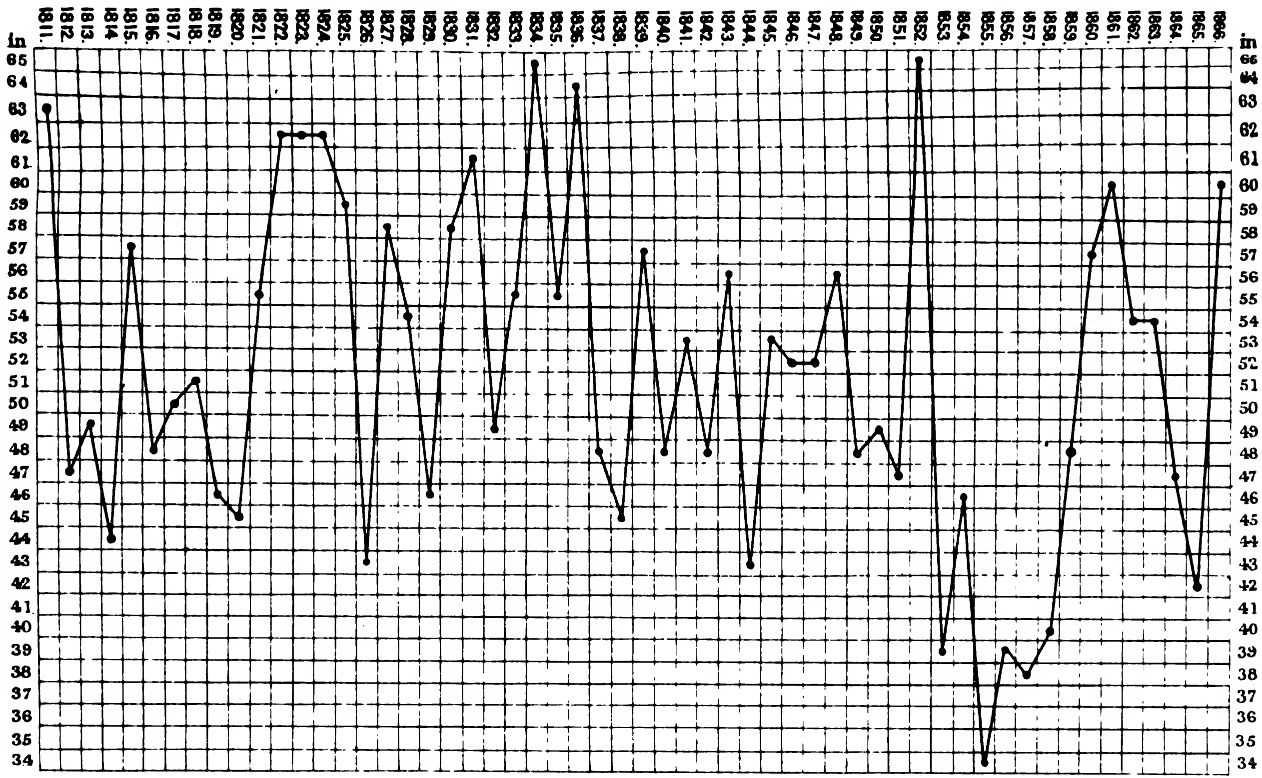
It is now getting quite fashionable to keep a rain-gauge, but to be generally useful they should all be put under systematic regulations and rules, with allowances for situation, height above the sea, and other circumstances.

The average number of rainy days at Kendal is 176 in the year. The mean temperature about 47°.

The rainfall seems excessive, as compared with many other counties, although the number of rainy days is not in proportion. The amount of wet, however, makes ploughing operations and cereal crops very riskful and uncertain, and often proves excessively inconvenient in hay-time, besides impeding out-of-door work generally; yet from the light, thin, and gravelly nature of most of the soil, and the rapid slopes for quitting the water, two or three weeks of warm dry weather set the farmers crying out for rain.

Generally speaking the county is well watered with clear streams and springs, but even a slight drought soon betrays weak places all over the land, where, thinly concealed, lie boulders, rocks, large stones or "cobbles," and beds of hungry sand, gravel, or "sammel," from which the herbage or crops speedily deteriorate till restored by welcome rain. The Westmorland farmer is rarely altogether satisfied with the weather, which, at all events, affords him a never-failing topic for conversation and speculation on change; but on the whole the abundance of moisture must be looked upon as a beneficial arrangement.

ANNUAL RAINFALL TAKEN AT KENDAL DURING EACH YEAR
FROM JANY 1ST 1811 TO DECR 31ST, 1866.



* 1826 is still spoken of as the 'dry Summer.'

Considering the above circumstances, there is more land ploughed than there ought to be. Wheat is grown, after costly bare fallows, about Newby, up to 600 feet; and oats, about Shap, up to 900 feet above the sea-level. In a cold wet summer the crops never get properly ripe, and oats often stand out till October or November. On steep slopes the heavy rainfall washes away all the best soil. All kinds of rural reform are slow of accomplishment, so hard is it to move out of the accustomed track, and numerous are the excuses why land, under the above circumstances, is not turned to grass. One reason is, the land has been so long and hard ploughed that "it won't grass," but requires an outlay for seeds, manure, subsequent top-dressings, and years of patient waiting, with little return, which very few farmers can afford; neither, even if they had the capital, could they be fairly expected to lock it up in the absence of a proper lease or security.

At the same time, it would be a great error to rush into the opposite extreme. Westmoreland is admirably adapted by nature for breeding and rearing stock, which must remain in-doors for many long months in winter, and could not be kept as they are, or in anything like their numbers, without an ample supply of oat-straw and turnips.

The vales of Kent, Lune, and Eden, the neighbourhood of Milnthorpe and Burton, &c., are moreover fitted naturally for partial tillage, and if proper attention be paid to cleaning and manuring, and rotation of crops, with a rest of two or three years in grass between each course of cropping, these soils may be rendered more productive, more profitable to the farmer, and permanently to the owner, in tillage than otherwise.

A safe rule would be, in high, cold, and especially undrained localities, plough none; in more favoured districts, plough only for home consumption, making all into manure at the homestead.

Another influence of the mountainous character of the county is backward vegetation in spring and unseasonable frosts. On the hill-sides there is rarely any vegetation till May. Snowstorms occasionally occur even in that month, and in 1860 deep drifts remained in hollows amongst the rocks on Helvellyn till July, returning again in October. It must be noted, however, that there is now much less snow than formerly. The older inhabitants remember snow lying on the ground for several weeks at a time, whereas it now is seldom seen for more than a few days at once. When the Lancaster and Carlisle Railway was made in 1844, with its deep rock cutting on Shap Fell, many were the prophecies that it would be snowed up every winter—an event, however, which has not yet happened.

Cattle.

Said Pringle in 1793—"The cattle are of the Long-horned or Lancashire breed, excellent feeders, and possessing in an eminent degree the desirable property of laying on fat. The heifers and barren cows, if well chosen, are confessedly good thrivers, and in great request among the graziers of Yorkshire. Not many years ago there was killed at Lowther a bullock weighing 132 stones." No such thing as a long-horned ox can now be found in the county, the breed being extinct. Till within a very few years back one or two herds still lingered in the mountain dales near Cockermouth in Cumberland, and a well-known cattle-dealer was accustomed to purchase a lot for grazing on his farm near Kendal, but it is understood that no more can now be had. This is somewhat to be regretted, as, notwithstanding their alleged slowness in arriving at maturity, they possessed hardihood and other properties suiting the exposed grounds and cold and wet climate. It should be remembered that there were no green crops nor artificial foods in their day, and they existed under circumstances which finer breeds could not endure. They would have made good crosses with the short-horns. It is not improbable that the present system of forcing may result in weakening the constitution of stock.

The short-horns were introduced about 45 years ago, and have gradually supplanted the native breed. Many first-rate herds are now to be found throughout the county, and every farmer of any account keeps his own short-horned bull. Previous to the regulations consequent on the cattle plague (which happily Westmorland entirely escaped) considerable quantities of Galloway, Highland, Irish, and Dutch cattle were shown at the great fairs of Appleby and Brough, and these, spreading through the country, led to crosses with the short-horns, which raised useful stock for the high-lying farms.

Every spring there is a great exodus of stock from Westmorland to the great grazing district of Craven. Of those summered at home, many go to be fed on turnips in Scotland and low farms in the county. In the immediate neighbourhood of Kendal the dairy farmers usually keep up their stock bred at home, and feed off the old cows. Many bullocks and gelt cows are sent off as far as Norfolk.

In some parts of the county, as about Crosby Ravensworth, cattle are liable to a disease called "cripple," and also "red water." In the former complaint the animal has a continual hankering after bones or the clothes off the hedge. The bones crackle, and death ensues. Generous feeding is the best cure, and both these diseases disappear after draining, liming, and

improving the land. In the limestone districts, where the water is so hard as to show petrifying properties, surface-water in puddled ponds should be provided for the cattle.

Butter now forms a profitable item, and the Westmorland housewives are perhaps not surpassed anywhere in its manufacture. Its superior sweetness and flavour are well known and appreciated in the manufacturing towns, where it is in great demand accordingly. The competition amongst the middlemen, or dealers, became so keen that special weekly markets have been established at Shap, Orton, Ravenstonedale, Warcop, &c., where the farmer readily obtains the full value of his produce. Among the many benefits obtained from railways are the equalisation of markets, and the rise of prices at home, instead of a large intermediate profit being taken between the producer and consumer.

SHEEP.

In March, 1866, Westmoreland owned 224,664 sheep. It would be interesting to know what proportions were in "Fell stocks," properly so termed, seeing that nearly one-third of the entire area of the county remains in "Fells." Taking a standpoint on the ridge or "backbone" of the county at the head of Long Sleddale, the Fell sheep west thereof are Herdwicks, whilst those east and north are of the Scotch, black-faced, or "rough" breed.

The Herdwicks (once not inaptly described as "the breed best standing starvation") appear to suit the Lake mountains the best. In traversing these several mountain ranges, a striking difference is observed in their herbage and configuration. The western parts rise more abruptly into craggy and rugged peaks, with sweet herbage amongst the precipitous rocks. The northern and eastern ranges are more rounded in outline, the herbage coarser, and the summits more covered with bog and heather.

The flocks are sometimes the property of the landlord. On entry on the farm, or on the 5th of April, "viewers" on each side, usually neighbouring farmers well up to the work, are appointed on each side, who report on the various numbers and classes, such as rams, ewes, wethers, and hoggs, specifying the proportions with the value of each per head. The tenant gives bond for the value, and is to deliver similar numbers of like value and condition or make good any deficiency at the end of his tenancy. In other cases the sheep-stock belongs to the tenant, who, nevertheless, takes and leaves them at a valuation, as if once the "*heaf*" be lost it is difficult to recover. The right of common of pasture is appurtenant to the ancient tenement, and is described in letting a farm as unlimited, *i.e.* not

limited by number or stint, but legally limited to the number of animals *levant* and *couchant* on the ancient tenement in winter. In other words, no farmer should in summer turn on more sheep or stock than he can winter on his ancient land and its produce. Practically speaking, however, this well-known rule of law is a dead letter, and the term "unlimited" is correct enough. Every one turns on as many as he can find room for, and sends away all he cannot keep alive at home in winter.

In these apparently peaceful vales, whose inhabitants seem so unsophisticated, there remain remnants of the border freebooter's spirit, on the principle "he to take who has the power, and he to keep who can." Those having most land adjoining or near the fell, and living convenient to it, will take more than their proper share, so long as human nature remains as it is, and always has been, while those further off must be content with less or nothing. The keen competition amongst the stock-owners and shepherds now and then leads to sheep-hounding, worrying, assault and battery, and work for the lawyers. Among the old hands, Sunday is often the favourite day for a quiet dogging of the neighbours' sheep off the best ground. The sheep have wit enough from experience to move off sharply on hearing the whistle of the hostile shepherd, without waiting for his dog. As a general rule each flock knows and keeps its own "heaf," or particular part of the common, usually known by pretty well defined boundaries, such as a "syke," prominent rock, or a watershed; but this as a mere matter of convenience only, there is no exclusive privilege, the whole common is open, and sheep can be turned on any part so long as there is no "dogging" or driving others.

The Herdwicks in particular possess a strong natural instinct in keeping to the heaf when yeaned, and, have been known to return thereto from very long distances, crossing rivers and other obstacles, sometimes with the lamb following.

All the Fell sheep are remarkably hardy, enduring great privations. The ewes are generally brought down to lamb in the "inland," and are often seen nibbling the best meadows bare in a backward May. In keeping up the full stock a number of ewes are put to the ram to secure the usual proportion of Fell ewes. The surplus ewes are put to Leicester and long-woolled rams for "half-bred lambs," which are sold off in autumn. Where the ground is suitable this system is very profitable. The Fell wether-lambs are kept till three years' old. In one sense there is no profit in this, but wethers best maintain their ground against encroachers on the heaf, or perhaps encroach themselves, keeping others back. The draft ewes are usually sold off in October. They should be disposed of when five or six years

old, as they then begin to get weaker in constitution, and give less and worse wool.

Each flock has its distinctive mark of ownership, registered in a printed volume, particularising every owner in Westmorland, Cumberland, and Lonsdale North. A meeting is held annually at Kirkstone Top for the exchange and rectification of "the sheep who have gone astray" during the preceding season, some of which occasionally ramble across the mountain in an unaccountable way to long distances.

The "hoggs" are mostly sent away from October till April to be wintered in low allotments and inclosures. Such allotments as produce little beyond "ling" and coarse bents are purposely not grazed in summer, so as to secure "roughness" for wintering. Since more attention to good management has been awakened, the low-country farmers are not so willing to turn a penny in this way as formerly. These little animals have keen noses and appetites for "fresh fields and pastures new," and are as "lish" (nimble) as cats, so that scarcely any fence can turn them. The price of wintering a few years ago was from 2*s.* 6*d.* to 3*s.* each, but now is about doubled.

In the fall of the year it is customary to salve the Fell sheep with a mixture of tar and butter, the notion being that not only is the animal kept warmer and drier, but that the fleece will weigh heavier. Mr. Irving of Shap Abbey, one of the largest stockowners and most spirited and intelligent farmers, prefers dipping his sheep, and after sixteen years' experience adheres to it, in prefence to salving. The apparatus costs only 3*l.* 10*s.*; Biggs' preparation being used for aged sheep, and M'Dougall's for the hoggs. Five hundred sheep can be dipped in a day, at a cost of 1½*d.* each, salving being estimated to cost 8*d.* He recommends as essential that the dipping should be performed in dry weather, and that each sheep should remain in the bath at least one minute, a mere plunge being useless. He has adopted the same plan with the Herdwick stock at Wythop Hall with equal success, and considers the opening of the sheep's coat, as by salving at the commencement of winter, to be injurious and against nature. The dipped wool commands from 1½*d.* to 2*d.* per lb. more in the market than the salved.

"Fell wethers," at three and four years old, when the Fell is not overstocked, come therefrom weighing 14 lbs. per quarter; ewes 10 to 12 lbs., the mutton being unsurpassed in flavour. Large numbers go to be fatted on turnips on arable farms in the valleys, and on such farms a considerable breadth of turnips is provided annually for this purpose, and let off to the owners of the sheep at from 6*d.* to 7*d.* per sheep per week, with great advantage to the fertility of the land.

Wool has of late years been a profitable article. The Fell fleeces may average from 4 lbs. to 5 lbs. each. Messrs. Whitwell, Busher, and Co., have recently established monthly sales by auction at Kendal, where the farmer has the advantage of warehouse-room, and commanding the full market value, on paying a reasonable commission.

Prizes for the mountain breeds were obtained by Westmorland farmers at the Royal Agricultural Shows at Carlisle and Newcastle.

On the lower commons, allotments, and hill pastures, half-bred lambs from the Herdwick or black-faced ewe and the Leicester ram, give a very ready and profitable return, and the system suits admirably on mixed heathy grounds where there is no over-stocking. Sometimes the lambs come double, and they are usually sold off at the end of summer at from 20*s.* to 24*s.* each.

The Leicesters prevail on the lower farms. Southdowns and Shropshire downs are found in a few first-class farms, but are not common.

If the remaining commons were, where practicable, inclosed, and others moderately stinted, better boned and better woolled sheep might be kept, and more profit made, with less trouble and expense than at present. The only drawback being that perhaps we should more seldom enjoy a leg of four-year-old wether mutton; while the school of Lake Poets, and the shade of Wordsworth, would doubtless pronounce it as a ruthless profanation, if their grand mountains were to be defaced by rigid lines of six-foot walls, set out by the surveyor's parallel ruler.

So long as the tall chimneys of Yorkshire and Lancashire smoke, so long will the Westmorland farmer have a never-failing demand for all his produce—beef, mutton, butter, cheese, and wool. His corn he can keep at home to manufacture meat with.*

Pasture Land.

The commons above referred to are in their original state, or as they have existed for unnumbered ages, unaltered by man; and so must they mainly continue. Some improvements might be made by open guttering or surface drains, but so long as the lands remain in common this is not likely to be attended to to any extent.

The heavy expense of fencing, especially of making many

* In 1797 Fell wool sold at 5*d.* per lb.; 4-year-old wethers sold for 9*s.* to 13*s.*; ewes about 8*s.*; hoggs, 2*s.* 6*d.* In 1792, "nearly one-third" of the sheep in the county perished from storms and disease.

miles of boundary-fence against adjoining parishes, is the great obstacle to further enclosures. Where A wishes to inclose, there is no power to compel B or C adjoining to contribute a fair proportion of the cost of erecting a boundary-fence. The Inclosure Acts certainly point out one way for A to evade making the boundary-fence; but it mends matters very little, the full benefit of any inclosure being unattainable till each owner can have the full and exclusive control of his own land, to lock his gate, and stock the ground at his pleasure.

Wherever an inclosure cannot be accomplished within a reasonable cost, the common may be stinted or converted into a regulated pasture at a very light expense. Afterwards the smaller owners may sell their stints to the larger, and in course of time, all getting into fewer hands, the extent of subdivision-fences may be materially reduced, so as to justify the expense of a complete inclosure.

The hill and rough pastures cover 21½ per cent. of the whole area of the county. Many of these were originally or till lately common, and remain pretty much in their original condition, being used mainly for "half-bred lambs" and wintering sheep.

The ancient meadows and pastures are nearly one-third of the entire area. Of first-class feeding or "bullock-land" very little is found in the county. Good pieces of old meadow and pasture exist about Kendal, Milnthorpe, Kirkby Lonsdale, and Ambleside. From 1½ to 2 tons per acre is considered a good crop of hay. A large breadth of hay is cut in the valleys, and in the neighbourhood of Orton, Ravenstonedale, and Kirkby Stephen; and a deficient or a badly secured hay-crop is a great drawback, as the winters are very long, and cattle must be foddered. The very dry and hot year of 1859, with its scant hay-crop, was followed by one of the opposite extreme—a very backward spring, deluges of rain, snow-storms, and absence of sunshine; and if there had been no railways to fetch hay from Lancashire and greater distances, many of the sheep and cattle in Westmorland must either have been starved to death or sent away for fodder.

The meadows are usually covered with farmyard-manure in alternate years. On mixed farms the "muck" is saved for the meadows, and the crops treated with "artificials."

Lime has always been the favourite top-dressing for pasture-land, especially on the slate-rock formation, where it acts magically in producing a fine sweet herbage. Limestone is generally abundant over the county. Public kilns are established at Kendal, Ravenstonedale, Stainmore, Morland, &c., and on the formation nearly every farm has its own quarry and kiln. The usual dose for a strong, heathy, rushy, or benty pasture is from 200 to 300 imperial bushels per acre, an under-allowance being

of little use. It is laid out from the cart in convenient heaps, and generally left to "sour" before being spread. The cost at the kilns is 3*d.* or 3½*d.* per imperial bushel. Where the cartage is long, as for instance from Kendal to the top of Long Sleddale or Kentmere, 8 or 10 miles of bad road, and where the land to be limed slopes upwards very steeply, the operation becomes very laborious and costly, especially if the hire of man and horse, and wear and tear of cart and harness, be reckoned in. So steep and rugged are many of the hill-side pastures, that the lime has frequently to be carried in bags or swills for considerable distances; and a cart-load, after all the labour, time, and trouble, to get it to its destination, looks in a very small room indeed when emptied out. Notwithstanding all these drawbacks the process is always considered to "pay." A farmer who is observed to be leading plenty of lime is booked as one of the right sort, and prospering; and strong is the faith that the further you carry lime the more potent is its effect.

One most important point is, lime must never be applied to wet land, or it will be thrown away; the beneficial effect is most strongly marked on newly drained, sour, rushy land, with a strong subsoil; and on this, or on mixed heaths and bents, the fine grasses and white clovers spring up plentifully after a good dose of lime. The first dose should always be a heavy one; after which the good effects will continue for twenty or thirty years, and the mark between limed and unlimed land be plainly visible; afterwards the pasture begins to recede. A second coat of lime never answers anything like so well as the first, and some artificial dressing is usually then resorted to.

A compost of lime, soil, road-scrapings, and manure, all well mixed up and decomposed, still remains a favourite top-dressing for young seeds.

It is probable that bones would in many cases answer fully as well as lime, and the labour and cost of applying them must be much less when the lime has to be led a long way, and the ground to be dealt with is steep and difficult of access with a horse and cart.

The writer recently superintended the drainage of a cow-pasture of twenty acres, formerly wet, producing sour blue grasses, which no beast would bite; the subsoil was stiff clay, resting on limestone. The field having been thoroughly tile-drained, half of it was top-dressed with lime, and the other half with dissolved bones, at the rate of 6 cwt. per acre. The latter began to show much sooner than the lime, bringing up in profusion white clover and fine grasses, greedily appropriated by the cows. The application of bones is strongly recommended on old cow-pastures; their indiscriminate use, however, may lead to

costly failures and disappointment. On thin, light, and gravelly soils, or on bare limestone-land, they have often little or no effect, but they are pretty sure to answer on strong newly drained soils, naturally producing heath or ling, rushes or bents. They have been found also to have a wonderful effect in renovating old pastures where other top-dressings have failed.

In favourable situations, hill-side or upland pastures, especially such as have been a long time ago ploughed and laid down dirty, and with bad, or perhaps no seeds, are greatly improved by being again broken up, cleaned, and laid down to pasture with rape and seeds, forming luxuriant pasturage for a few years, after which they should be top-dressed.

The following is a good selection of grass-seeds for laying land down to permanent grass without a corn-crop :—

Devonshire Evergreen Rye-grass	1 bushel.
Italian Rye-grass	2 lbs.
Cock's Foot	7 "
Meadow Fescue	4 "
Hard Fescue	4 "
Cow-grass	5 "
Alsike Clover	3 "
White Clover	3 "

Arable Farms.

With the exception of some half-dozen farms near the shore of Morecambe Bay, scarcely any are purely arable, the prevailing class being of a mixed character.

The return of crops in 1866 were—

	Acres.			Per Centage of the County.
Wheat	2,194			
Barley	2,628			
Oats	17,042			
Rye	84			
Beans	68			
Peas	114			
		22,130	=	4·42
Green Crops.—Turnips	8,292			
Potatoes	1,767			
Mangold	84			
Carrots	102			
Rape and Vetches	946			
		11,191	=	2·23
Bare Fallow		2,105	=	0·41
Clovers and Grasses under Rotation		18,519	=	3·69
Total Arable Land		53,945	=	10·75

The average produce per acre is, of wheat, 28¾ bushels.
" " barley, 37 "
" " oats, 34¾ "

On the lighter soils, as south and east of Kendal, and in the Vale of Eden, the usual course is, 1st year, oats; 2nd year, turnips (sometimes half drawn and half eaten by sheep on the ground); 3rd year, barley or oats, sown with seeds; 4th year, grass. On soils a shade stronger the course is prolonged to five or six years; and this is approved of as the best. Arable land in in many places has become "clover sick" and "turnip sick;" one reason being that those crops are repeated at too short intervals. When the land has rested two or three years in grass, and the seeds have been well manured or dressed with lime-compost, it does not often fail to grass well after the second year, and comes out much fresher for the succeeding grain and green crops.

On the clay-soils about Newby, Morland, Strickland, Ormside, &c., where turnips cannot be depended upon, the course is,—1st year, oats; 2nd, bare fallow, limed and manured; 3rd, wheat; 4th, seeds; sometimes mown for horse-hay.

Oats almost invariably form the first crop on breaking up. Wheat has been tried, but given up as a failure.

The rule is, always to have a green crop or fallow between white crops; and in most leases or conditions a heavy penalty is attached to two successive grain-crops. Sometimes, however, the seeds "miss," and then a second corn-crop may be taken if well manured.

Mr. R. Knowles, an able practical agriculturist, gives the following comparative estimate of a four years' course of tillage and grazing on a mixed farm of fair quality in Westmorland (see pages 22, 23).

In sowing seeds for one year's grass, about 1½ bushel Italian rye-grass and 9 lbs. American cow-grass are used. For two or three years' grass the following is recommended:—

Perennial Rye Grass	1¼ bushel.
Italian Rye Grass	6 lbs.
Cocksfoot	5 "
Timothy Grass	2 "
Cow Grass	8 "
Alsyke Clover	4 "
White Clover	2 "

Grass cutters and reapers are becoming common. Perhaps no better turnip husbandry can be found anywhere than about Kendal, Milnthorpe, Kirkby Lonsdale, and Kirkby Thore.

All produce except grain and potatoes is, by rule, consumed and made into manure on the premises; by special agreement, however, on a few farms near towns, or where more wheat than commonly is grown, the tenants are allowed to sell straw and turnips, on bringing back an equivalent in manure.

The following description of the management on the home farm at Levens, the property of the Hon. Mrs. Howard, and under the care of her able steward, Mr. Milne, will be useful, as a model of the best Westmorland farming.

Lawrence House Farm contains 240 acres, besides 24 acres of moss land on Levens Marsh. Of the former, 155 acres are in meadow and pasture, and 85 under tillage. A five-years' course is adopted, viz., 1st year, oats out of ley; 2nd year, green crop; 3rd year, a corn-crop sown with seeds; 4th and 5th years, grass.

After the corn-crop has been removed from the seeds, if they be vigorous, sheep are allowed in dry weather to depasture them till about the beginning of November, after which no sheep or cattle are allowed thereon till March. With favourable weather in March ewes and their lambs are turned on, and allowed to remain until the latter end of the first week in May, when they are removed, and the crop allowed to grow for hay, which is always cut *just before* the grass and clover-seeds come *generally* into flower. The seeds are always depastured the second year, and for oats out of ley are generally ploughed out in January in open weather; 5 bushels of seed are sown and well harrowed into the soil; a heavy clod-crusher, and afterwards a heavy roller is applied, it being desirable to have the soil firmly compressed. When not laid or twisted, the corn is reaped with a reaping-machine, and with the scythe or hook when lodged, as the reaping-machine under these circumstances would not cut the crop properly, nor leave an even stubble.

After the "ley corn" is removed the land is ploughed, if possible in dry weather, with a *deep* strong furrow, afterwards harrowed, and then left till April, when it is again harrowed and ploughed across the autumn furrows with *deep narrow* furrow-slices; the harrows are again applied, and, if need be, the roller, and any particles of couch-grass carefully gathered and carried off; but for several years there has been no couch-grass to deal with on the fallows of this farm, as should always be the case where land has been once thoroughly made free from couch and other weeds and *clean* seeds always sown.

One acre of the fallow land is planted with potatoes, and the remaining 16 acres with turnips, one-half swedes, three-eighths yellow bullock, and one-eighth large white globe. The manure generally applied is about 12 tons of well-made farmyard-manure, with either 2 cwt. of Peruvian guano, or 3 cwt. of superphosphate, or 3 cwt. of bone-meal. Early in November, if the weather be dry, a beginning is made to store the turnips. A large quantity is carted to the homestead, and stored in a shed for use onwards till the latter end of February. The whole of the remainder is set in the field, five rows being placed together

(neither

ONE ACRE OF GRAZING,

Sheep and Cattle.	£.	s.	d.	£.	s.	d.
First Year.						
Four sheep, at 25*s.*	5	0	0		..	
Charges and contingencies	0	5	0		..	
Rent and taxes	2	2	0		..	
Wool of four sheep, at 10*s.*		..		2	0	0
Four sheep, at 37*s.* 6*d.*		..		7	10	0
Share of profit on bullocks, say 1 bullock to 8 acres ..		..		0	10	0
Winter eatage		..		0	7	0
Profit	3	0	0		..	
	10	7	0	10	7	0
Second Year.						
Same as above	7	7	0		..	
Ditto		..		10	7	0
Profit	3	0	0		..	
	10	7	0	10	7	0
Third Year.						
Same as above	7	7	0		..	
Ditto		..		10	7	0
Profit	3	0	0		..	
	10	7	0	10	7	0
Fourth Year.						
Same as above	7	7	0		..	
Ditto		..		10	7	0
Profit	3	0	0		..	
	10	7	0	10	7	0

RESULT OF FOUR

	£.	s.	d.
First year	3	0	0
Second year	3	0	0
Third year	3	0	0
Fourth year	3	0	0
	12	0	0

*** It would seem only fair to charge the

[CO]MPARED WITH PLOUGHING.

FOUR-COURSE SYSTEM.

First Year.	£. s. d.	£. s. d.
Cost of ploughing, rolling, and harrowing	0 13 0	..
Seed	0 15 0	..
Reaping	0 13 0	..
Carting, housing, and marketing	0 5 0	..
Thrashing	0 8 0	..
Rent and taxes	2 2 0	..
Oats, 40 bushels	..	6 0 0
Straw	..	1 10 0
Profit	2 14 0	..
	7 10 0	7 10 0
Second Year.		
Deep ploughing stubbles in November	0 12 0	..
Spring harrowing and grubbing	0 5 0	..
Second ditto	0 5 0	..
Cleaning, &c.	0 10 0	..
Stitching, 3s.; seed, sowing, &c., 10s.	0 13 0	..
10 cwt. superphosphate	4 0 0	..
Thinning and cleaning	1 5 0	..
Pulling, carting, &c.	0 12 0	..
Rent and taxes	2 2 0	..
20 tons swedes, value on ground	10 4 0	10 4 0
Third Year.		
Ploughing and harrowing	0 12 0	..
Seed	0 15 0	..
Grass-seeds	1 5 0	..
Sowing grain and seeds	0 5 0	..
Reaping	0 13 0	..
Carting, housing, and marketing	0 5 0	..
Thrashing	0 8 0	..
Rent and taxes	2 2 0	..
Oats, 40 bushels	..	6 0 0
Straw	..	1 10 0
Profit	1 5 0	..
	7 10 0	7 10 0
Fourth Year.		
Five sheep, at 25s.	6 5 0	..
Charges and contingencies	0 5 0	..
Rent	2 2 0	..
Wool of five sheep	..	2 10 0
Five sheep, at 37s. 6d.	..	9 7 6
Share of profit on bullocks, 1 to 8 acres	..	0 10 0
Profit	3 15 6	..
	12 7 6	12 7 6

[FOUR] YEARS' NET PROFIT.

	£. s. d.
First year	2 14 0
Second year	..
Third year	1 5 0
Fourth year	3 15 6
Credit, farmyard manure from ploughing land	0 15 0
	8 9 6
Balance in favour of grazing	3 10 6
	12 0 0

grazing side of the account for top-dressing.

(neither the tops nor tails removed) and carefully covered with earth, except a portion of the tops which stands up above the earth-covering. It is found that the cost of storing the crop is in most seasons much more than repaid by the improved quality of the turnips, their freedom from destruction by game, rabbits, crows, and pigeons, and from decay caused by frost.

The next year the land is sown down, usually with oats, and with grass and clover seeds, viz.:—

Perennial Rye Grass	$1\frac{1}{4}$	bushel.
Italian Rye Grass	$\frac{3}{8}$	"
Cocksfoot	$\frac{3}{8}$	"
Timothy Grass	$2\frac{1}{2}$	lbs.
American Cow Grass	7	"
Alsyke Clover	3	"
White Clover	2	"

After the corn-seed has been harrowed in, and the land, if at all rough on the surface, rolled, the grass and clover-seeds, all intimately mixed together, are at once sown by the common sowing-machine, first up and down the field, and then across, making sure of the seeds being evenly distributed over the whole of the surface. A single stroke of a light harrow is at once applied, and afterwards a heavy roller.

On the marsh or moss land, considerably detached, a four-course shift is followed, viz., 1st year, oats; 2nd, green crop; 3rd, corn and seeds; 4th, seed-grass. The seeds being 2 bushels of Italian rye-grass, and 10 lbs. of English red clover per acre. The green crops on this land are principally mangolds and carrots, to which about 7 tons of good farmyard dung, and 6 cwt. of superphosphates are applied.

Hay is made from about 60 acres, including the first year's crop of clover and grass seeds, and the old meadow-land. A mowing-machine is used and much approved of.

The average yield of oats is about 7 quarters per acre. The wages paid to the labourers all the year round are at the rate of 14*s.* per week.

The cattle kept are short-horns, Galloways, and West Highland, with crosses between the Galloway cow and short-horned bull. Both short-horns and crosses are bred on the farm, and sold fat, the heifers generally at $2\frac{1}{2}$ years old, and the bullocks at $3\frac{1}{2}$ years.

The sheep are pure Southdown ewes, part yearly set to a Leicester ram. A few fat lambs are sold to the butchers; the others, both Southdowns and crosses, are wintered, the downs in the fields, and the crosses in airy sheds, where they are fed on turnips, hay, and oats. They are shorn early in May, and sold about a fortnight afterwards very prime fat. The down hoggets

are shorn about the latter end of May, and fattened on grass the same summer. The cast ewes are also fatted before being disposed of.

Steam Cultivation.

There is only one farmer in the county, in the writer's knowledge, who has tried steam-cultivation, viz. Mr. John Nicholson, of Kirkby Thore Hall, who approves of it. It is very doubtful, however, whether it ever will become general, or its use profitable in Westmorland. The area of arable land is small; the farms are comparatively small; the fields are often any shape but square; the surface very broken and irregular, and the soil often full of boulders, rocks, and large stones, fit to smash any machinery. Moreover, the correct tendency is to plough less and graze more.

Draining.

Tile-draining has progressed considerably. There are some districts, however, where the ground is so stony and rocky that sufficient stones come out of the cutting to wall the drain with. Lord Lonsdale was the first to commence tile and *deep* draining, and has drained upwards of 10,000 acres on his vast Lowther estate, which however extends into Cumberland. Sir Richard Tufton, Edward Wilson, Esq., of Rigmaden, the Hon. Mrs. Howard, William Crackanthorpe, Esq., Wilkinson Dent, Esq., and others, have also drained considerable portions of their estates with marked benefit. The usual course is for the landlord to execute and pay for the work, the tenant leading the materials, and paying 5 per cent. interest on the landlord's outlay. Thorough drainage in ordinary cases costs 6*l.* to 7*l* per acre.

Tile works on the northern side of the county are established at Lowther, Wetherriggs, Julian Bower, Bleatarn, &c. 2-inch pipes cost about 22*s.* 6*d.* per 1000. The Kendal district contains no clay, and tiles are brought from Lancashire, 2-inch pipes costing about 20*s.* per 1000. Considering the heavy rainfall, it is not considered safe to use smaller sizes. It is not usual to put in collars, except in quicksands or soft bottoms.

Notwithstanding all that has been done, plenty yet remains undone. The rainfall being much heavier than the average of other counties, larger tiles, more capacious outfalls, and narrower distances between the drains are required, and from forgetting these points, and also putting in the drains too shallow, or with too little fall, great mistakes have been occasionally made, and consequent failures, discouraging further efforts. The subsoil of much of the undrained soils is a hard, compact, impervious mass of clay and gravel indurated, locally called "sammel," and many

contend that it is useless to cut deep into this. Lord Lonsdale was one of the first, if not the first, to set the example of *deep drains* up the slope instead of the old plan of shallow drains across it. In spite of partial failures, to be accounted for in various ways, the great principle of depth, and "the utmost fall" must be admitted to have been conclusively established as successful.

Instances can doubtless be pointed to, where deep drainage has not succeeded in laying the land dry; but a close examination will generally discover some other reason for the failure besides depth, such as tiles too small, and badly laid, careless filling-in, not driving the heads of the drains far enough into the apparently dry hill-side (where the water-bearing strata lie concealed), or inattention to the outfalls.

The writer, in setting out the drains in a poor rushy pasture field, was assured by a neighbour, looked on as an authority in such cases, that as it was "sammel to the top" it was of no use cutting the drains more than 2 feet, or 2 feet 6 inches. A prejudice, however (if it may be so called), in favour of depth, induced a trial drain 4 feet deep, or 5 feet, or till water was found. When 4 feet was reached slight fissures and veins of sand betrayed themselves in the dreaded "sammel," plenty of bottom water soon appeared, and the drainage is a success.

In another case the drift or hard deposit of clay and gravel continued till the workmen were overhead in the drains; at a depth of about 6 feet, a bed of fine sand, evidently laid there by water ages ago, was come to, out of which the water rushed profusely. In either of these cases a less depth must have been entirely useless.

No universal rule, however, as to depth and distance can be laid down. Experience and judgment can alone decide these points on the spot, but more failures have occurred from too shallow than too deep drains.

Homesteads.

"A farm-house should be somewhat elegant, to give pleasure to its possessors and to allow the wife to take delight in it. It should be built on the most healthy spot on the farm, in a temperate air, such as the middle of a hill commonly enjoys, where it is neither stifling in the summer, nor exposed to the rage and storms of winter."*

The farm-buildings are mostly stone and slated, the ancient thatched buildings having nearly all disappeared; great improvements have been made within the last half century, and, on the

* 'Columella.'

whole, Westmorland may stand a comparison, in this respect, with more favoured counties, and yet there are very many homesteads very deficient in proper accommodation for man and beast, ancient and dilapidated, low, damp, and ill-ventilated. The house, barn, and cow-house are often all joined together, and very often the barn is what is called under-housed, *i.e.* the cow-house is underneath the barn floor. The barn is built on a sloping hill-side, the floor being level with the ground on the high side, underneath which is the cow-house, termed in the Kendal district the shippon, and on the northern side of the county the byre, the access to which is from the low side of the building. On the barn floor, above the cows' heads, is stored the hay and straw for their winter fodder. The head room of the cow-house is generally much too low, the floor roughly paved, very uneven, undrained, with stagnant pools of liquid manure. The poor animals, huddled closely together, must suffer the certain consequences of dirt, deficient light, and foul air.

In more modern erections the cows are ranged under a "drag roof" by the side of the barn, alongside which, in front of them, runs the "fodder-gang," or feeding-passage.

Buildings.

Buildings lately erected are generally suitable for the ordinary mixed farm, without any special distinguishing features. It is easy to condemn the present state of farm-buildings generally, but the remedy is not so easy. The erection of entire new buildings is exceedingly costly, often running away with four or five years' rent of the farm. Farmers cannot afford to pay interest on much building, nor indeed is it expected of them; the leading of all stones, slate, timber, lime, sand, &c., being a heavy undertaking, and the wear and tear of carts, &c., so considerable, that the farmer doing this does his full share. Sometimes the whole homestead gets so bad that there is nothing for it but to pull down and rebuild, but in the majority of cases the old buildings are patched up, and added to according to circumstances. In this way great improvements might be made, draining the sites, spouting, and making all watertight, and by perforating the walls in proper places proper ventilation without draughts and cold might be secured. The common draining tile, inserted in the wall, answers very well for this purpose. The old underhoused cow-house can generally be conveniently converted into barn-room, and the cow-house added by a "drag," or by radiating sheds, connected with the barn for fodder, and with adjoining turnip-house.

One almost universal failing talked about, time out of mind,

at agricultural dinners, but met as it seems only in talk, is the provision against waste of farm-yard manure. A covered "midden stead" is a curiosity. The dung from the cow-houses is heaped up near the door, exposed to the elements, drenched by every shower, while the washings and filterings run away by the roadside, or percolate into the nearest water-course or ditch. Most of the older homesteads are placed in low ground, near a running stream, rendering the preservation of the manure difficult, a point on which we should not imitate the example of our forefathers. Here and there is an attempt at a tank, but the fact remains that a large proportion of the manure, and its most valuable constituents, is absolutely wasted. The researches of science have proved that manure exposed to rain loses very much in substance and quality.

In many cases, where the manure is not mixed with straw or litter, it might be applied fresh, as soon as made, so that the land would appropriate all the ingredients at once; but in mixed farms the midden stead should be covered, so as to exclude rain, not air, and the liquid preserved in a tank, and pumped up over the solid, so as to saturate and decompose it. Here, however, the tenant cannot do all, and the landlord's assistance is necessary.

Many of the older farm-houses are deficient in proper sleeping accommodation for the farmer's family and his servants. If this be, as is alleged, one of the causes of the blot on Westmorland's morality—the excessive rate of illegitimacy—not a year should be allowed to pass away without a resolute effort for a remedy.

Some few farms have lately employed steam for thrashing, chopping, pulping, &c., and others avail themselves of water-power, where convenient.

Leases.

Although leases are far from being general, they are gradually becoming more so than formerly. On the great Lowther Estate, and also on the Dallam Tower Estate, it is understood that no leases are granted, but the tenants, notwithstanding, have confidence that so long as they pay rent and observe conditions they will not be dispossessed. As, however, time goes on, and the produce of land is increased, and prices rise, re-valuations are occasionally made and the rent increased, and such an arrangement is generally cheerfully acquiesced in. Sir Richard Tufton, adopting the Scotch system, has granted 19 years' leases on some of the larger farms on his Appleby Castle Estates. On the Rigmaden Estate, and also on the property of William Crackan-

thorpe, Esq., the leases are for nine years, almost invariably renewed, with fair re-adjustments of rent, not necessarily at the end of every term, but as circumstances call for this. On these properties it is not unusual for a farm to remain in one family's occupancy for generations. The family of Mr. Dobson, of Williamsgill, have farmed theirs under the Crackanthorpes for considerably more than a century. On the Rigmaden Estate one farmer can boast of having personally attended 104 half-yearly rent-days, never missing one.

On the smaller properties leases of seven years are common. The usual conditions for entry are, on the southern side of the county, for husbandry and tillage on 14th February; eatage, 5th April; and house and buildings on 12th May: by this arrangement the out-going tenant can consume all the vestures before leaving. In some cases the manure belongs to the out-going tenant, not to remove, but to be paid for by the succeeding tenant, when measured and valued. In other cases the manure belongs to the farm without payment; and generally, when it does not already belong, the landlord takes an opportunity to purchase it and annex it to the farm. Off-going crops are nearly all abolished. On the northern side of the county the entry is generally 25th of March to the land, and Whitsuntide to the buildings. Nearer the Cumberland boundary, towards Penrith, the entry is sometimes at Candlemas (14th February) to the whole. In such case, if the tenant has wintered his full stock of cattle, he is allowed to sell off the premises such straw as remains unconsumed.

When bare fallows prevail, the incoming tenant pays for that, and putting in the wheat-crop. When the outgoing tenant has not depastured the young seeds after Martinmas the incoming tenant pays the seed-bill.

The rent is made payable in advance on 1st June after entry. Usually, however, it is paid half-yearly, in December and June, not in advance. Green-crop between white-crops. Consumption of vestures on the premises. Tenant to keep all in repair except slated roofs and main timbers, and to lead all materials for landlord's repairs. Such are the usual conditions.

There is no system of tenant-right in the county, nor, in the absence of a lease, any security against a tenant receiving notice to quit, or having his rent raised, after he may have permanently improved the land by high farming, liming, boning, or otherwise.

On the general question a great deal may be said on both sides. In some cases, as in the prospect of a sale of the estate in a few years, a lease might be an undesirable clog. A gentle-

man having invested his all in land, may fairly object to hand over his property for long periods to a farmer who may turn out a disagreeable neighbour, of objectionable moral character, or deficient in requisite capital, skill, and energy; and, in spite of the most stringent conditions, a farm may almost imperceptibly, although surely, be robbed and depreciated by an unprincipled tenant. On the other hand, no farmer can be expected, without security of some kind, to put anything into the land which he cannot readily get out again with a profit. The fact is patent that long leases and good farming are always found together, and, as a general rule, no leases and bad farming go in company. If the landlord coldly stands by, declining to grant a lease, affording no confidence, or security, or facilities in some other way, it is pretty certain that he and his property will be left behind in the general rate of progress. All agricultural improvement produces a rapid increase in the value of the fee simple of the soil. Self-interest alone must prompt the far-seeing landlord to grant facilities and encouragement to deserving tenants, not to name higher principles, the duties attaching to the possession of property, and the "golden rule" for both landlord and tenant, in all their relations.

Labourers.

The farm-labourers are usually kept in the farmer's house, often taking their meals at his own table with his family. Wages are increasing. Emigration, and the attraction of large public works, railways, &c., and the iron-works in Furness, have tended to increase the cost of all kinds of labour, and good servants, male and female alike, are becoming a scarce article. A first-class "head man" and ploughman commands from 20*l.* to 25*l.* or more per annum, with victuals, lodging, and washing. Young men, 12*l.*; lads, 8*l.*; maid servants, 12*l.*; girls, 5*l.*, and upwards.

In the villages, or where cottages can be had, married out-of-door labourers are found, whose wages are now from 2*s.* 6*d.* to 3*s.* per day, where not employed the year round. In hay-time and harvest, men get from 4*l.* 10*s.* to 5*l.* per month, with victuals, &c. Labourers' cottages let from 1*s.* to 1*s.* 6*d.* per week. Very little has been done in the way of providing gardens.

The in-door servants, especially on the southern side of the county, are well and substantially fed. Meat dinners, with milk and oatmeal porridge; oat-cake, cheese, and milk for breakfast and supper. In harvest meat suppers are provided; and at mid-forenoon and afternoon a refreshment of oat-cake, cheese, and beer, called "the drinking."

Pringle, in 1793, reports the wages of ordinary labourers at

1*s.* 4*d.* to 1*s.* 8*d.* per day. Men-servants, 10*l.* to 12*l.* a year. Maids, 5*l.* to 6*l.* Wages have doubled in the last half century.

Woods.

The woods of the county amount to only 3·75 per cent. of the whole area. Some of these, (such as Melkinthorpe, Naddle Forest, Helbeck Wood, and numerous small patches in the vales, are remnants of the primeval forests which originally spread over all the lower parts of the county, and climbed up the breasts of the mountains. A considerable portion is coppice-wood, especially to the west of Kendal and in the neighbourhood of the Lakes. Coppice woods are cut every fourteen or fifteen years; the crop of a good wood then selling for from 12*l.* to 18*l.* per acre. As soon as the crop is removed the fences are, or ought to be, carefully made up, to guard against the inroads of sheep or cattle inflicting permanent damage by cropping the young shoots. No further attention is then requisite, except to keep open surface drains when the ground is naturally damp or the water cannot escape. On properties where the extent of coppice is considerable, as about Windermere, Rydal, &c., it is set out in different lots, so as to secure a regular "fall" of one wood throughout fifteen years, and a pretty regular annual income therefrom. There are no buildings to keep up, the land is generally too stony, rocky, and rugged to be of use otherwise, and, on the whole, coppices are looked on as a desirable part of landed property. A good coppice-wood is injured if large timber-trees, termed "standers," are allowed to prevail in it. The produce is mainly used for bobbins, of which there are extensive manufactories at Staveley and Ambleside. The rest is sold for basket-rods, hoops, &c.

Larch plantations have been formed extensively, the late Bishop Watson starting them about the commencement of the present century. Larch is perhaps the most profitable wood grown, coming early to maturity, and always commanding a ready sale and high price. Steep, rough, craggy ground, worth from 2*s.* to 5*s.* per acre rent, *if on a dry subsoil*, cannot be turned to more profitable account than by planting with larch. The young trees must be carefully preserved till they are out of the way of being cropped by animals; and one important point, often overlooked till too late, is gradual and judicious thinning, for want of which the plants "spindle" and never make any proper size. The thinned poles are useful for railing, then they come in for pit prop-wood. At fifty or sixty years the larch attains its full maturity, and is then worth 50*l.* or 60*l.* per acre. In favourable situations a larch of fifty years' growth will con-

tain as many cubic feet of wood, worth from 1*s.* to 1*s.* 2*d.* per foot. In planting, undue exposure to the west wind and a wet soil must be carefully avoided.

Within the last few years, however, larch-planting has been almost brought to a standstill on account of the very general prevalence of disease, which scarcely any plantations have entirely escaped, whilst many acres have sometimes died together. Many reasons and ingenious explanations have been volunteered, but this, like the potato-disease, remains somewhat of a mystery. Amongst the causes guessed at are—1, atmospheric influence; 2, the aphis insect; 3, severe spring frosts and cold wet summers stopping the flow of sap; 4, weakened plants, forced by manure in the nurseries, and raised successively off the same land. Possibly there is something in one or more of these causes co-operating together, or with hidden causes, but the fact remains, and is unfortunate.

It is noteworthy that about Windermere, and the district west of Kendal, the disease is not nearly so strongly developed as in the district eastward. It is suspected that the subsoil has some hand in this.

When a larch plantation has been felled off, it is found that a second planting with the same wood rarely answers. And the rule is to defer planting for two or three years. If larch be thought inappropriate, hard woods, ash and sycamore, are recommended, or, in favourable ground, a coppice may be formed.

From the accumulation of decayed leaves, this ground, if well limed, will often make good pasture.

Westmorland stands sadly in need of more plantations for shelter and ornament to the bleak and bare hill-sides, and to provide timber for farm-buildings and general use, seeing that the onward march of improved agriculture tends to sweep away ordinary hedge-row timber; when it is remembered how many thousands of acres of larch are annually required for railways and mines, the question assumes an almost national importance.

Fine ancient timber trees are found about Lowther, Appleby, Levens, Dallam Tower, Rydal, &c., but there are no extensive forests as in some other counties.

Improvements.

Very material improvements in the productive powers of the county have been made within the last fifty years by the inclosure of commons. In 1797 Bishop Watson estimated that three-fourths of Westmorland was waste land. Thirty years ago surrounding commons closely approached the town of Kendal—

Hay Fell, Hutton Common, Potter Fell, Ratherheath, Underbarrow Common, and others, now partially cultivated or forming average and useful pastures, have all been inclosed within a comparatively recent period: portions of these have been drained, limed, planted, and otherwise improved. All over the county the same process has been going on, and even some of the highest fells, such as Ambleside, Hartsop, Long Sleddale, and Grayrigg, have been, or are about to be, inclosed.

Tiles have worked a revival in draining, which is in itself not only a fundamental improvement, but the stepping-stone to most others.

Perhaps the most important modern improvement is the "Helsington, Underbarrow, and Bradley Field and Levens Drainage." This is a dead level tract of about 2000 acres, little above the sea-level, and not unlike a miniature of the fens of Lincolnshire. The greater part was originally bog and peat-moss, cultivation creeping onwards on the removal of the turf—at that time the main supply of fuel for Kendal and the surrounding district. About sixty years ago it was allotted and inclosed under the Heversham Inclosure Act, the proprietors being very numerous. The Commissioners made embankments against the sea, and provided main drains and flood-gates. In course of time, from defect in the original outfalls and from the gradual settling down of the surface, the lands suffered from want of proper underdrainage, and were often submerged by floods. About the year 1838 an Act of Parliament was obtained to provide for the main outfall and sluice being carried three miles further seaward, so as to discharge into the Kent Estuary at Ulpha Crag. Four feet additional fall were thus obtained, the main cuts enlarged and deepened, and the surrounding hill waters, or "hard water," separated and discharged by "catchwaters." The works were completed at a cost of about 15,000*l.* The result has been most successful, and instead of a wide expanse of marsh and bog, often supporting little but snipes and wild ducks, there now appear wide fields of golden grain and glistening green crops; the annual value being in many instances raised from 10*s.* to 35*s.* or 40*s.* per acre. The original peatmoss when removed leaves, within about four feet of the surface, a substratum of fine marly clay. The main drains are low enough for the branches to be cut 12 or 14 inches into this clay by a tool called the "long mouth." On the surface of the clay the workmen form "shoulders," which receive a solid wedge of firm turf, and an excellent drain is thus provided at a cost of from 4½*d.* to 6*d.* per rod of 7 yards, or about 30*s.* to 35*s.* per acre. Tiles are not desirable here, on account of the dead flat and frequent backwater. In practice it is found these drains

answer every purpose effectually for many years, their worst enemies being rats and rabbits.

The drainage being completed, the underlying clay is dug from pits in the sides of the field or ditches, and applied broadcast on the surface, at the rate of 100 cart-loads per acre; it afterwards forms a fine friable mould, full of vegetable matter, and produces extraordinary straw and root crops and luxuriant clovers. There are scarcely any buildings, and most of the produce is conveyed to the neighbouring "hard land" farms, each of which possesses and highly values its "moss" portion. The land rarely gets any but artificial manure, which is applied to the green crop. The course is the four years' shift. Notwithstanding, after thirty years of this treatment, the fertility of the soil seems unabated. Italian rye-grass is grown to a considerable extent for seed. There are still remaining patches of the ancient mosses, around the margins of which, as for many ages past, peats are got by neighbouring farmers, and by the villagers of Brigsteer and Beathwaite Green, who mainly subsist by the sale of this fuel at Kendal. As the moss recedes potatoes are grown extensively, and on the unclayed ground are remarkably exempt from disease; but they are often cut down by sharp frosts, even in May and June.

Before this drainage, ague was a common complaint amongst the surrounding villagers, but now it is never heard of.

The sea occasionally returns, as if to assert a right to its ancient dominion. In the winter of 1852 an extraordinary tide swept over the embankments, and submerged the low-lying lands in Foulshaw, Levens, &c., several feet deep, driving the inhabitants to their upper rooms for several hours, drowning the cattle in considerable numbers, and otherwise inflicting serious damage. Apart from these casualties the annual cost of keeping all the main drains, embankments, flood-gates, and other works in order, does not exceed 2*s.* per acre.

Another striking improvement in the same district is the embankment and reclamation from the sea, of the Castlehead and Meathop Marshes, by Mr. Brogden, in connection with the works of the Ulverston and Lancaster Railway, where it crosses the Kent Estuary of Morecambe Bay. Mr. Brogden purchased a large portion of the bay itself from the Duchy of Lancaster, and has embanked and reclaimed from 500 to 600 acres. Portions of bare sea-sand, which formerly were covered with the tide every day, were scarified, sown with seeds, and liberally dressed with bones and other manures, and soon became luxuriant pastures, the wonder and admiration of the neighbourhood; carrying extraordinary numbers of sheep and cattle, the former sometimes looking half overhead amongst the clovers. On other

portions now in hand Mr. Brogden is trying various sorts of arable crops, but the operations are not yet far enough advanced to decide whether ploughing or grazing is the more profitable on land of this nature.

Many persons in different parts of the kingdom doubtless remember the cold and cheerless ride which, before the days of railways, travellers encountered over the dreary mountain waste of Shap Fell, a large tract of about 6000 acres, the property of the Earl of Lonsdale. No operation, in recent times, better deserves record than the extensive drainage, liming, and other improvements recently carried out there by his lordship.

The portions operated upon are from 1200 to 1600 feet above the sea-level. This ground was previously, in Westmorland phrase, mere "room out of doors," *i.e.* of insignificant value, carrying little beyond grouse and black-faced sheep, but never looked upon as capable of, or worth improvement. The design of draining and liming this class of land at such an elevation was thought by many a costly and hazardous experiment. In some measure an experiment it undoubtedly was, there being no previous guide to point out what could, and what could not, be successfully and profitably accomplished.

Interspersed with the heath, with the advantage of being intersected by good roads (the old and new great north turnpikes), were considerable stretches of "white land," *i.e.* producing decent grass with bent and rushes, while still better pasturage was found in the grassy and sheltered dells and dishes. The upper portion of the Fell is naturally a mountain sheep-walk and grouse ground, and must remain so.

Under the skilful superintendence of Mr. Parkes the first operation was to tile-drain the wet portions, and this was carried on from year to year, advancing higher and higher up the hill side, till upwards of 1200 acres were drained. Limestone being on the ground, kilns were built, and about 1500 acres have been limed. The lower lying, sweeter, and limed portions were enclosed with six-feet walls, and sheds erected in suitable situations for sheltering stock.

Numerous were the hostile critics and foreboders of failure; any attempt to invade these regions in such a way being contrary to all previously received opinion and precedent. Some parts of the work doubtless might have been better done, and with the experience gained would be done differently if started afresh. The returns may not have been so certain and uniform as in more favoured situations, but on the whole the result is a great success, and beyond expectation.

The ground was partly stocked with the proprietor's cattle and sheep (bought on in the spring, and sold off by auction in

autumn), and also thrown open to the public for agistment on the following terms — aged cattle, 40*s.*; two-year-olds, 32*s.*; yearlings, 23*s.* This privilege was eagerly taken advantage of by the low-country farmers, and extensive herds of fine cattle covered the ground every summer, in numbers beyond expectation, coming off in capital condition in autumn. The ground, however, was found to be too high for successfully wintering "Hoggs." In the dry hot summer of 1859, when all the pastures in the Vale of Eden were parched, and the watering-places dried up, the herbage on Shap Fell was succulent and plentiful, and the supply of fine water unlimited. In cold wet summers, such as too frequently occur, the results, of course, were less favourable.

This tract is now let to a tenant at a rent of about 800*l.* per annum.

Many other improvements might be noted on a smaller scale, as, for instance, on Mr. Nicholson's farm at Kirkby Thore Hall, purchased by Lord Lonsdale a few years ago, in a neglected and ruinous condition. The homestead has been rebuilt, the greater portion of the farm thoroughly drained, the crooked beck-course straightened and embanked, old fences grubbed, and new straight fences made, and the whole estate renovated—a credit both to landlord and tenant; and in almost every township may be found farms on which the occupier can point to some substantial improvement, such as a moss or bog drained and reclaimed, heaps of rocks and stones removed, fell-pastures limed, or other marks of progress.

Improvements still required.

Any suggestion of improvements still necessary must be travelling over very old ground. Agricultural, like other reforms, in the aggregate must begin with individuals, each man reforming himself not so much by striking out new rules and principles as by acting up to the old ones, which, as in higher subjects, though universally recognised, are but too rarely acted up to.

Numerous points of detail calling for amendment have already been mentioned in the preceding pages. The following may be summarised :—

1. A better education for the rising agricultural population. In dealing with the various manures now pressed on his notice, and in conducting many of the operations on the land, the farmer has in some measure to grope his way in the dark, and to trust to chance. It is impossible that farmers should all be chemists and geologists or botanists, but it is certain that the rising

generation would benefit by more knowledge of these subjects than that possessed by their forefathers; and that they should be able to keep their accounts and conduct farming affairs on systematic rules and business principles.

2. Better farm-houses and accommodation for stock, and arrangements for preventing waste of manure.

3. There is yet ample scope for further thorough drainage, reclamation, and planting.

4. It is absolutely necessary that enterprising and deserving tenants should have better security and encouragement for investing capital in the land, and developing the latent energies of the soil.

5. The inclosure or stinting of the remaining commons, so as to secure more equitable and peaceful enjoyment of rights, to prevent overstocking, and so improve the breeds of sheep and quality of wool.

Improvements might be made by lowering and regulating the levels of some of the lakes, at the heads and around the margins of which valuable meadows might be made of lands now mere swamps, and floods might be prevented.

The extensive tracts of now unproductive moss lands in Foulshaw and Witherslack invite skill and capital for their reclamation.

Swampy tracts, such as Kentmere Tarn Meadows, Sandford Mire, &c., should be drained by co-operation of the different owners.

No class of persons receives so much lecturing and advice as farmers, and in reckoning up their shortcomings too little allowance is made for many difficulties with which they have to contend, such as farms unduly weighted by high rents (whether caused by too keen competition or too exacting landlords), insufficient capital, inevitable losses by a series of ungenial seasons, against which all human exertion is powerless. As regards the Westmorland farmer in particular, of none can it be more truly said, that he "rises early, late takes rest, and eats the bread of carefulness." No great improvement can be accomplished without the hearty co-operation of both landlord and tenant. Self-interest may be the mainspring in all human actions, but here, rightly applied, it does not clash, but harmonizes with the eternal principles of right and mutual duty, and both parties have a noble work to do in keeping and dressing the garden of Mother Earth, the work set out and appointed by the great Creator.

February 23rd, 1867.

II.—*On the Temperature of the Sea, and its Influence on the Climate and Agriculture of the British Isles.* By NICHOLAS WHITLEY, F.M.S.

THE object of this paper is to determine the surface-temperature of the sea around the British Isles, and of parts of the North Atlantic ocean; as a means of tracing its effects on the climate and agriculture of this country.

In an essay on this subject, published in Vol. XI. of the First Series of this Journal, I chalked out in broad outline the direction and temperature of the currents of the Atlantic Ocean, describing that life-giving river in the ocean—the Gulf Stream, conveying the heat of the equatorial sea far up into the North Atlantic, and distributing its warmth along our western coasts; and the Arctic current sweeping the loose ice of the frigid north to the shores of Greenland and Labrador, and thus screening us from its withering influence. But while the course of each of these currents was then tolerably well known, the temperature of the sea-water around the British Isles was very imperfectly understood, and but few thermometrical observations could be obtained of that part of the North Atlantic from whence our warm south-west wind derived its heat and humidity.

Feeling that this subject demanded a more searching investigation, I have, since the appearance of that essay in 1850, applied myself to obtain further information respecting it, by engaging careful persons to take daily observations on sea temperature at different parts of the coast line; several gentlemen also kindly undertook to register for me the indications of the thermometer at other places. The Royal Irish Academy has published the results of observations on sea temperature at several points of the Irish coast; and the Meteorological Society of Scotland have for some years investigated the same subject on the Scottish shores. These observations, however, were wholly taken at stations on *land*, where the surface water of the sea must to some extent be influenced by its contiguity; and it appeared to me that the effects of the sea on our climate could not be thoroughly comprehended, without an inquiry into the temperature of that portion of the broad Atlantic over which the westerly winds sweep in their passage to our shores. I therefore applied, and was kindly permitted, to make extracts from the Log-books of Cunard's steamships of voyages, extending over several years, between Liverpool and New York, showing the temperatures of the sea and air every four hours.

The materials thus obtained have supplied information of which my former essay was deficient, and I am therefore now

desirous of following up and perfecting that inquiry by adding to the results of my earlier labours the deductions which I have drawn from this additional matter.

It may be said that this is rather a philosophical inquiry than a practical subject suitable for the pages of an agricultural journal; but it must be remembered that "climate beats culture," and that in order intelligently to adapt our course of culture to the climate, we must understand the nature of the elements with which we have to deal. Men may sometimes blunder on success, but pains-taking knowledge is the only sure road to real advancement.

The subject is so practical, that whether we understand it or not, it will force itself on our attention, control to some extent our farm operations, and regulate our daily labours; indeed, the productive powers of our soil will never be fully developed until the system of cultivation and the nature of the produce be brought still more fully to accord with the peculiar capabilities of the climate.

How great and varied these capabilities are—how much we owe to the protecting influence and genial warmth of ocean currents—we yet but faintly comprehend. The British Isles lie between the same parallels of latitude as the dreary coast of Labrador, of which Cartwright draws this melancholy picture:—"Of all the dreary sights which I ever yet beheld, none ever came up to the appearance of this coast. . . . . The spots where any verdure was likely to appear were covered with drift banks of snow; the shore was barricaded with ice seven feet thick; most of the best harbours were then not open, and all the rest had so much loose ice drifting about with every wind as to render it difficult to anchor therein; all towards the sea was one uniform compact body of rough ice, which extended fifty leagues at least." *

The two countries in the same latitude present the contrast of eternal winter and perpetual spring—of a snow-covered land, with abject poverty and the greatest amount of misery which human nature can endure, and the emerald green of our winter, our abundant resources, and abounding comforts—and for these contrasts we are indebted to the influences arising from the genial warmth of an ocean current.

In further investigating this subject the materials now at my command are as follows:—

1. Daily observations on sea temperature, taken for me at various parts of our coast line, at the Scilly Isles, and at Shetland.
2. The monthly means of the sea temperature around the coast of Ireland, from the Transactions of the Royal Irish Academy.

* Cartwright's 'Sixteen Years on the Coast of Labrador,' vol. ii. p. 83.

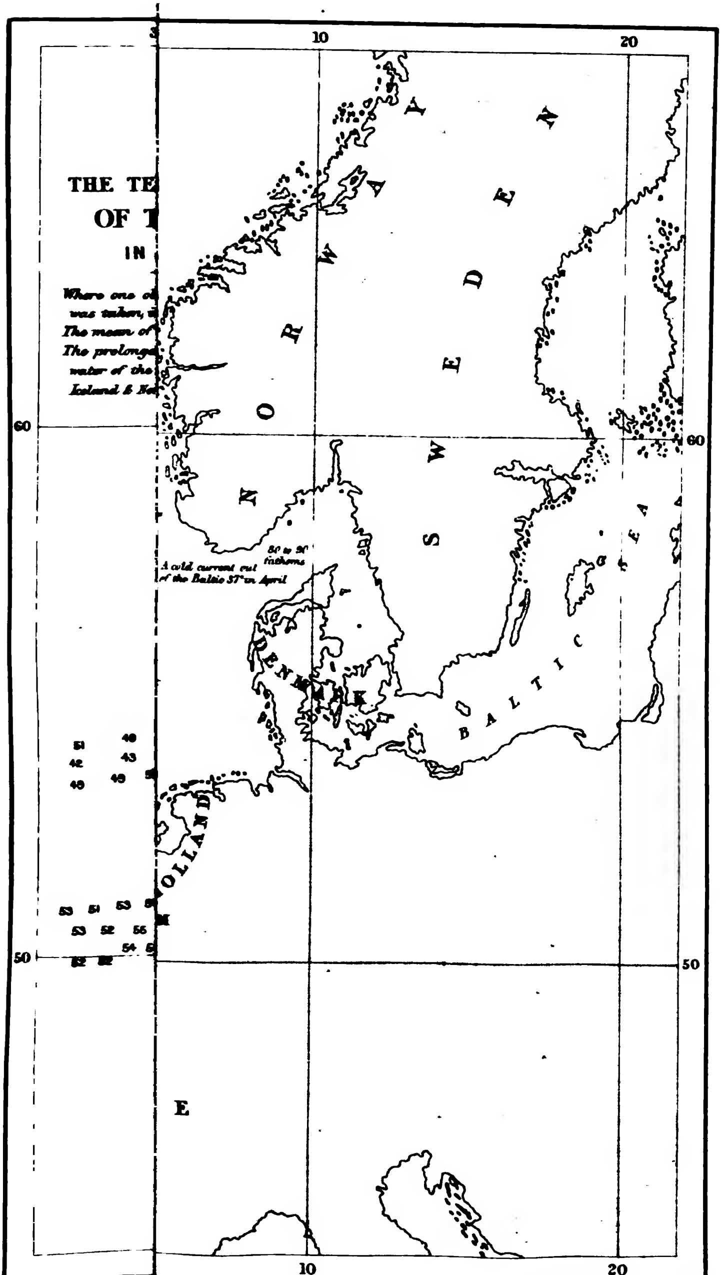
3. The same around the coast of Scotland, by the Scottish Meteorological Society.
4. Extracts from the Log-books of Cunard's steam-ships, showing the temperature of the sea and air six times in the twenty-four hours for each month, between Liverpool and New York.
5. In reference to rainfall, I established some years back, with the aid of many observers, two lines of gauges from the Western coast over the high lands to the interior. They were worked for me by many careful observers, who kindly gave me a helping hand in this inquiry; and monthly returns were sent me extending over several years.
6. The Transactions of the Meteorological Societies of England and Scotland.

Thus the materials are at present as abundant as they were before scanty, and furnish the means of investigating in all necessary details the subject of this paper.

The reduction of this large mass of observations was a matter of considerable difficulty and labour. The returns from the coast stations were readily resolved into monthly means, but the scattered observations on the open sea around these islands required to be embodied in a set of twelve charts, showing the monthly results; and the records from Cunard's Log-books formed another set of twelve charts, extending across the North Atlantic. Of these only the January and June charts, combined in one, are printed with this paper; but a full comprehension of the whole subject could not have been obtained without tracing it throughout all its monthly variations over the wide Atlantic.

The observations taken at the coast stations are reduced and arranged in the Table on page 41.

On comparing the readings of the thermometers at the shore stations with those a short distance from the land in the winter months, they showed a lower temperature for the water on the coast line than in the open sea, arising probably from the chilling effect of the cold night air of the land, and the lower temperature of the rivers; and in order to obtain results uninfluenced by these causes I constructed charts of the seas around the British islands and laid down on them such observations of sea temperature as I could obtain. On the combined charts (see opposite) the January observations show the amount of heat in the winter sea; and those of June, distinguished by being severally inclosed in a ring, have been selected, not as showing the highest temperature of the summer, but because the observations were then more numerous and perfect than in July, especially, in the narrow part of the Atlantic between Norway and Iceland, where the course and character of the north-eastern



Stanford's Geog! Estab! 6 Charing Cross. S.W.

Table I.—Showing the Mean Temperature of the Surface-water of the Sea for each Month, and the Year, at the following Coast Stations of the Rivers Thames and Allen, and of Springs in Cornwall.

Place.		Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean of Year.	Year.
England.															
St. Mary, Scilly		49·3	50·6	50·6	52·0	54·0	58·0	61·2	62·6	60·2	58·1	53·0	48·5	54·8	1856
Ditto		45·3	47·5	49·8	54·0	61·8	65·3	65·7	64·5	59·8	54·1	49·4	49·6	55·1	1857
Seven Stones Lightship ..		51·0	50·6	50·2	50·0	52·0	57·8	62·8	64·0	58·0	58·0	54·2	52·8	55·1	1859
Ditto		51·4	48·9	47·8	44·7	51·5	53·8	56·9	56·4	56·1	55·0	53·2	52·4	52·3	1860
St. Agnes, North Cornwall		48·5	48·0	46·9	48·7	52·2	55·5	60·0	62·1	57·8	55·0	53·8	51·9	53·3	1852
St. Ives, Cornwall		46·4	46·5	47·0	48·9	51·8	54·2	56·0	59·2	59·6	57·0	51·4	48·5	52·2	1854
Falmouth		50·0	48·0	48·0	48·0	52·0	55·0	57·0	60·0	58·0	57·0	52·0	48·0	53·0	1851
Great Yarmouth		37·1	39·2	40·6	46·3	49·9	57·5	61·1	65·4	59·6	55·7	46·9	41·2	50·0	1856
Scarborough		40·5	41·2	42·8	44·0	50·0	53·2	55·8	56·7	55·2	52·0	48·0	43·5	48·6	1853–4
The Thames, Greenwich ..		38·9	40·9	43·1	49·0	56·6	63·2	65·7	64·3	59·6	52·1	46·0	40·5	51·6	..
River Allen, Truro		46·3	41·2	46·5	51·2	56·5	56·1	64·0	63·1	58·0	50·5	51·2	50·2	52·9	..
Springs in Cornwall		51·0	51·0	50·0	51·0	52·0	53·0	53·0	54·0	54·0	55·0	53·0	52·0	52·5	..
Ireland.															
Castletown	South	47·1	46·6	46·8	49·7	53·5	56·3	60·3	61·3	60·3	54·8	49·2	48·6	52·9	1851
Bunown	West	48·7	49·4	50·9	51·4	54·4	57·8	60·2	62·9	61·5	55·1	49·3	48·1	54·1	1851
Portrush	North	46·9	45·6	45·7	47·9	50·6	54·3	57·5	58·7	58·7	54·7	49·6	47·8	51·5	1851
Cushendall	N.E.	46·6	45·7	45·6	47·2	49·1	52·1	55·4	57·0	58·3	55·6	51·6	49·4	51·1	1851
Donaghadee	N.E.	46·5	45·6	45·6	48·1	50·3	52·5	55·8	57·4	57·4	54·7	50·1	49·3	51·5	1851
Courtown	East	46·0	45·1	45·8	48·3	53·2	58·4	61·8	63·5	60·9	56·1	47·9	46·8	52·8	1851
Scotland.															
Otter House		44·0	42·1	42·6	46·7	48·4	51·0	55·8	53·9	53·2	51·0	48·6	45·3	48·5	1864
Oban		45·9	43·6	42·8	45·0	48·2	52·6	56·1	55·2	55·7	53·5	51·1	48·8	49·8	1864
Bernera		46·3	42·4	40·0	47·0	..	..	56·4	..	56·6	53·3	..	46·1	..	1864
Stornoway, Lewis		42·0	42·0	41·7	49·0	..	..	54·0	54·0	55·0	..	..	48·0	..	1864
Ditto		..	..	..	46·0	54·0	53·0	58·0	56·0	57·8	50·5	48·5	44·0	..	1865
Sandwick, Orkney		44·6	43·1	44·4	44·0	45·9	49·0	52·1	54·1	54·1	51·8	49·1	47·8	49·2	1864
Ditto		..	..	..	41·1	46·5	50·7	53·2	54·8	56·1	52·2	49·2	47·7	..	1865
East Yell, Shetland		..	44·5	..	..	..	49·4	51·6	52·5	53·0	51·0	49·0	46·7	..	Parts of years.
Lerwick, Shetland		42·1	39·8	40·8	41·9	48·2	52·8	54·7	54·6	51·9	47·1	46·4	42·6	47·0	1853
Dunrobin	N.E.	39·7	39·4	40·4	44·1	48·4	54·4	51·3	53·4	..	..	..	..	..	1864
Barry	East.	41·2	38·2	42·7	46·2	49·3	55·7	59·7	56·3	56·7	48·7	45·7	43·7	48·7	1864
Ditto	East.	..	..	..	47·7	49·2	57·7	59·4	58·4	57·7	48·2	46·2	43·1	..	1865
East Linton	S.E.	42·0	40·0	40·0	44·0	48·0	49·0	55·0	47·0	54·0	52·0	48·0	47·0	47·2	1864

Fahrenheit's scale of temperature is used throughout this paper.

eastern prolongation of the waters of the Gulf Stream were likely to be more apparent than in mid-ocean.

The Table, No. I, shows that the sea-water on our coast-line is coldest at the end of February, and warmest at the end of August.

That the greatest heat in January is found around the Scilly Isles and on the western coast of Ireland, and that the coldest part of the sea in this month is not at the northern extremity of Scotland, but on the eastern coast of England.

The water at Bunown, on the west side of Ireland, is 12° warmer than on the east side of England, at Yarmouth.

The January chart enables us to trace the variations of sea-temperature around the coast-line. In this month the temperature of the surface-water off the Land's End is 51°; on the western side of Ireland 49°; at the Hebrides 46°; at Orkney 44°; and at Shetland 43°.

Thus, in a latitudinal distance of 10° the decrease of temperature northward over the *sea* on our western coast is only 8°, while within the same extent of latitude the decrease on the *land* in the middle of the Eastern continent is 45°, and on the American continent 32°.

Continuing our survey down the Eastern coast we find, with some variations, a decreasing sea-temperature going southward from 44° at Orkney to 37° at Great Yarmouth, where the winter minimum is found.

We are also led to the conclusion that the German Ocean is but little influenced by any warm water which may pass through the Strait of Dover from the Gulf Stream, but that its winter warmth is mainly maintained by the much greater body of tepid water which the strong tides carry around the north of Scotland. This eastern sea is not only placed beyond the full influence of the warm current from the south, but its winter temperature is further depressed by the cold stream from the Baltic, and cooled by the icy floods of the continental rivers.

From mid-winter to the middle of April the sea remains at an almost uniform temperature, which rises rapidly in June and July, and reaches its maximum in August. At this season, under the influence of summer sunshine and the heat arising from the land-surface of the Continent, the sea-water on the eastern coast has a somewhat higher temperature than on the western.

The January chart also shows us that the surface water of the ocean 500 miles west of Ireland is uniformly 3° warmer than the water on the coast line.

But in order to comprehend the full effect of oceanic influence on our climate, we must extend our researches still further westward, to the birthplace of the south-west wind, and examine that portion of the sea from whence its warmth and humidity are mainly derived. The charts of sea temperature, which I

have constructed from the log-books of Cunard's steam-ships, show that this wind sweeps over the warm water of the Atlantic ocean for a distance of 1500 miles before it reaches our shores; and that by night and by day the water has an almost unvarying temperature; which is higher than any portion of the sea around the British Isles. These charts are too cumbersome to be appended to this paper, but the following Table, deduced from them, gives a condensed view of the mean monthly temperature of the surface water of the Atlantic on the course of Cunard's ships.

TABLE II.—SHOWING the Temperature of the Surface-water of the Atlantic Ocean, at every 5° of Longitude, from the South of Ireland to the Banks of Newfoundland, on the course of Cunard's Steam-ships.*

Months.	On the Banks.	Longitude West.						
		40°	35°	30°	25°	20°	15°	10°
January	30	57	53	54	55	54	52	51
February	31	54	53	52	53	52	52	50
March	32	54	54	55	54	54	52	51
April	34	57	55	55	52	54	53	52
May	34	55	54	55	56	55	53	53
June	40	60	59	58	56	58	58	57
July	45	60	59	58	59	60	58	59
August	50	61	59	60	59	60	60	59
September..	52	59	59	60	59	60	59	58
October	47	59	59	56	56	57	57	55
November..	44	58	57	58	59	57	54	53
December	32	55	54	54	54	54	53	52
Mean of the Year	39·2	57·2	56·2	56·2	56·0	56·2	55·1	54·2

This Table shows the extreme coldness of the water on the banks of Newfoundland for half the year, from December to May inclusive, when it is but little above the freezing point (32°). The Arctic current, owing to its greater velocity at this season, and the icebergs with which it is then loaded, impinges with great force on the upper limit of the Gulf Stream, and presses it down full 200 miles to the southward; but this powerful current cannot thus be subdued; it first bends eastward, and then its northern edge curves up in a mighty eddy, like river-water below the piers of a bridge, along the eastern edge of the cold current, and folds it in its warm embrace.† This remarkable eddy stands like a wall of fire on the eastern side of the cold current through which the icebergs cannot pass to chill our summers, or depress the genial warmth of our winter months.

* The course of Cunard's steam-ships from Cape Clear, is about due west on the 51st parallel of latitude, to longitude 35° W., from thence along the south of Newfoundland to Boston and New York.

† It is noteworthy, that the warmest water between Newfoundland and Ireland is found in close proximity to the ice-bearing stream from the northern regions.

It has in January a temperature of 57°, which is higher than that of the air in the month of May on the south coast of England.

From this part of the ocean eastward, for at least a thousand miles in extent, the temperature of the surface water in January is about 54°, it reaches its minimum of 52½° in February, and its maximum of 59½° in September, having a yearly range of only 7°. Over this thousand miles from west to east the heat distributed through the water is in the various months remarkably uniform. There are, however, some slight thermometrical indications of a warmer current passing northward, about the middle of the Atlantic; and there is also a narrow belt of warm water with a somewhat higher temperature than that of the adjoining sea off the south-west coast of Ireland, which may be the tail of Rennel's current; but these indications are too faint to produce any climatic effect on these islands. It is however important, in reference to the formation of cloud and rain, to observe that the warmth of the winter sea decreases full 3° on approaching the Irish coast.

This wide expanse of superheated water is no superficial stratum which any other element now in force can nullify or destroy; its heat is the accumulation of years, supplied from an inexhaustable fountain in constant operation. "It is calculated that the amount of heat discharged over the Atlantic from the waters of the Gulf Stream in a winter day, would be sufficient to raise the whole column of the atmosphere that rests upon France and the British Isles, from the freezing point to summer heat."† The surface temperature of this wide sea is uninfluenced by the changes of day and night, by calm or storm; and there need be no misgiving that the mighty Gulf Stream will lose its life giving energy, while the trend of the coast lines remains the same as at present; nor any fear that the climate of this country will be decreased in temperature by the chilling effects of the cold ice-bearing Arctic current, with 1500 miles of warm water between us and this benumbing stream.

Indeed the storms of winter rather appear to develop more fully the warmth derived from the Atlantic. In January, 1852, the 'Niagara' steamed from Liverpool to New York, through a hurricane of wind, hailstones, and snow. The successive entries in the log-book were—"Blowing a hurricane." "Hailstones and lightening." "Dreadful weather"—"still a hurricane." "Awful weather." But the noble ship steadily held on in her prescribed course, and the meteorological record is perfect throughout. Before the storm commenced the temperature of the water was 52° to 53°, but throughout the duration of the storm, and across the Atlantic, to the very verge of the Arctic current, it was 58°,

* 'Keith Johnston's Physical Atlas.'

and what is most important, as bearing on our present inquiry, is this,—that the air, amidst sleet and snow, and with a north-west wind, *was as warm as the sea;* and instead of being chilled by the storm, it was full 3° warmer than that of its mean for the month.

The same ship, on the same voyage, in 10° of latitude, further south on the American coast, found both the sea and the air below the freezing point.

But if the high temperature of this northern part of the Atlantic leads us to the conclusion that its water must have been derived from a southern source, it is also obvious from the wide distribution of its equitable warmth, that the thermometer does not detect any well-defined branch of the Gulf Stream flowing to the north-east. The full breadth of the stream is spread across the ocean, in a latitude above that where the south-west wind, as an anti-trade wind, comes to the surface, and blows with great regularity over a wide area: it passes across and presses on the whole width of the stream, and under its influence the heated water assumes the character of a drift current, and is thus carried into higher latitudes over a very wide portion of the Atlantic. Between the north of Scotland and Iceland, where the drifted waters are confined in a narrower space, it will be seen on the chart that in June traces of warm and colder water are found; but along the coast of Norway it again assumes the character of a true ocean current, which, flowing into the Arctic Sea, keeps open water in the whale-fisher's bight, even up to Spitzbergen.

If the Gulf Stream flowed through the middle of the North Atlantic, in the same manner as it does along the American coast in a narrow rapid and hot current, it would produce but little effect on our climate; but drifted as it is by the returning trade-wind it communicates its heat to the wide sea from Ireland to the banks of Newfoundland, and fills the whole space between Norway and Iceland. It is from this greatly extended surface of heated water that our westerly winds derive their warmth and moisture.

It is difficult to form an adequate conception of the amount of heat poured into the Atlantic by the Gulf Stream, and drifted northward by the south-west winds. It is only by comparing the temperatures on land and on sea that we can arrive at any approximate result. In January month the temperature of the air on mid-ocean is about 53° when in the same latitude, east and west; in the middle of both continents it is 5° below zero: the difference of 58° being equal to more than double the amount of heat which exists in England between the months of January and July. Here then is a cause which produces a much greater influence on local winter climate than the sun; and we begin to comprehend the extent and unfailing energy of that power which

reverses the normal position of the lines of equal temperature, and twists them from east to west into north and south curves. Our winter heat comes not from the south, but from the west.

But again: the average temperature in January of 50° north latitude, over sea and land, is about 16°; on the same parallel in the middle of the Atlantic it is then 53°; and on our western shores 43°; showing an increase of temperature over the sea of 37°, due to the influence of the Gulf Stream. Assuming that the outlines of sea and land remained the same, with no warm current of water flowing northwards from the torrid zone, then the January temperature of the south-west of England would be as cold as that of the south-east of Iceland; and on Scotland would fall the cold of the extreme north of Europe.

The effect of Sea Temperature on the Air.—It has been said that the Gulf Stream does not really produce such an effect on our climate as has been attributed to it; that in fact the winter heat over western Europe is the result of the south-west winds. Again, it has been urged that the latent heat released by the condensation of moisture on our western coast-line is the cause of our abnormal climate. But even admitting the full effects which these causes produce, we have only to carry the inquiry one step further back, to show that the warmth of the wind and the excess of vapour from the air are both derived from the heated surface of the ocean.

It has also been intimated that the south-west wind, returning as an upper current from the torrid zone, falls on the surface of the North Atlantic, and imparts its warmth to the water, and thus raises and sustains the high temperature of the sea around our coasts. This opinion raises a distinct issue. Does the wind impart its heat to the sea, or does the sea warm the wind? The generally-received opinion, that the air which rests on the surface of the sea partakes of its temperature, appears to receive confirmation from the character of the climate of coast-lines,—from the nature of the regular alternation of sea and land breezes; and a comparison of the amount of heat in the sea and air of the Atlantic tends also to confirm this opinion. An examination of four voyages across the Atlantic, from longitude 10° to 40° west, gives the following results as the mean of all the observations taken, about the 50th parallel of latitude on each voyage:—

	Temperature of Water.		Temperature of Air.
	°		°
January 15 to 22, 1849	52	....	49
„ 1 to 6, 1850	54·5	....	54·6
„ 7 to 11, 1851	50·6	....	49·6
„ 19 to 30, 1852 (the storm) ..	56·5	....	55·7
Means	53·4	....	52·2

Showing an excess of the heat of the water above the air of 1·2°.

The charts of the American coast also show that in the Arctic current the water and air are in January usually as low as 30°; that when the ship passes eastward into the warm eddy of the Gulf Stream the water rapidly attains a temperature of 57°, but the air lags behind, and its heat gradually increases over a distance of 250 miles before it becomes assimilated to that of the water. In all these cases the water is the governing element, has a preponderating influence, and cannot derive its higher temperature from the somewhat colder air which rests on it.

Winds.—The wind is the vehicle of climate; it is to us the carrier, bringing warmth and humidity from the west, or Continental cold from the east. The wind from each point of the compass impresses its peculiar character on the weather of each day, and it makes or mars the seasons as they pass. It is usual to speak of the variable and fickle nature of our climate, but this characteristic is mainly impressed on it by the indeterminate changes in the direction of the wind.

The following tables, which give a condensed view of the subject, are taken from a valuable paper by Mr. Glaisher in the Proceedings of the British Meteorological Society:—

TABLE III.—SHOWING the Number of the Days of the Wind, during each of the Years 1841 to 1860, referred to 8 points of the Compass.

Years.	Number of Days the Mean Direction of the Wind was								
	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.
1841	40	19	22	9	49	112	60	17	37
1842	46	40	31	15	31	112	38	25	27
1843	42	44	22	8	18	102	37	29	63
1844	48	57	18	14	22	89	35	26	57
1845	30	49	11	13	43	104	43	38	34
1846	27	25	20	18	39	94	30	22	86
1847	41	23	16	4	55	111	36	10	69
1848	53	38	19	36	58	90	29	20	23
1849	59	54	20	23	39	102	35	22	11
1850	59	48	24	21	30	116	27	19	31
1851	52	39	21	20	28	100	37	25	43
1852	45	58	36	21	52	108	27	8	11
1853	43	65	16	27	28	86	32	27	41
1854	31	45	17	20	30	117	42	30	33
1855	56	74	23	17	25	84	30	26	30
1856	44	54	27	30	31	80	50	26	24
1857	21	58	28	27	33	119	34	21	24
1858	26	61	38	27	26	106	40	29	12
1859	31	54	16	29	25	128	40	31	11
1860	30	47	26	19	22	120	64	31	7

TABLE IV.—SHOWING the Average Number of Days in each Month of each Wind, as found from all the Observations, 1841 to 1860, referred to 8 points of the Compass.

Month.	Average Number of Days the Mean Direction of the Wind was								
	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.
January ..	3·00	3·25	0·80	2·10	4·10	9·75	3·50	1·50	2·80
February ..	2·95	3·60	2·10	1·25	2·95	8·00	2·85	1·95	2·60
March ..	3·70	4·05	2·50	2·10	2·55	7·65	3·25	2·80	2·40
April	4·00	6·05	3·45	2·05	2·40	6·25	2·55	2·30	0·95
May	4·30	7·00	2·45	1·70	2·70	7·55	2·00	1·80	2·00
June	3·25	3·55	2·15	1·65	2·15	9·90	3·65	2·10	1·60
July	3·40	3·70	1·15	0·55	2·65	10·55	3·95	2·45	2·60
August ..	2·95	3·00	1·15	1·30	2·95	10·45	3·85	1·95	3·40
September..	3·60	5·25	1·85	1·65	2·00	7·25	2·55	1·50	4·35
October ..	3·10	2·50	1·15	1·80	3·40	9·10	4·25	2·05	3·65
November..	3·80	3·55	2·05	2·00	3·40	7·70	2·05	2·15	3·30
December ..	2·65	2·10	1·75	1·75	2·95	9·85	3·85	2·05	4·05
Sums ..	40·70	47·60	22·55	19·90	34·20	104·00	38·30	24·10	33·70

Thus arranging these winds in the order of their frequency, we have the average number of days in the year for each wind at Greenwich, as follows:—

From the south-west	.. ..	104 days.
„ north-east	.. ..	48 „
„ north	.. ..	41 „
„ west	.. ..	38 „
„ south	.. ..	34 „
„ north-west	.. ..	24 „
„ east	.. ..	22 „
„ south-east	.. ..	20 „
Calm	.. ..	34 „

It will be seen that our prevailing winds are from the south-west and from the north-east; that the south-west is the predominant wind for eight months of the year, and the north-east prevails from one to two months. There are, however, great inequalities in the persistency of these winds. Thus, in the year 1856 the south-west blew for 80 days; but in 1859 for 128 days. Again, in 1847 the north-east wind prevailed for 23 days only; but in 1855 it continued for 74 days. The whole character of the weather and the climate of the year is altered by these variations. The activity of the wind appears also to be subject to the same uncertainty, for the number of calm days ranges from 7 to 86 in different years.

The winds from the cardinal points of the compass are tolerably equally distributed throughout the year, but the dry and cold wind in spring from the north-east is a true periodical

visitor in April and May. But the most powerful and persistent wind throughout the year is the warm and moist south-wester: it is most prevalent in July and August, at this season often bringing wet harvest weather; it reaches a second and inferior maximum in December, driving back the Continental cold till after Christmas, and its influence is often felt through January.

Our two prevailing winds, the south-west and north-east, arise from the same cause as true land and sea-breezes,—viz., the unequal distribution of heat over the land and the sea. On the west of these islands, as I have shown, lies the wide Atlantic, with a surface heated to 54° in early spring. On the east, the continent of Europe has a temperature from 30° to 40° lower of cold, dry air, which becomes extreme in the north-east; and the variable nature of our climate arises from the winds as they prevail from these quarters. Let the cold from the north-east be ever so intense in winter, the powerful westerly wind will drive it back, occupy its place, and day after day the thermometer will stand at 50°.

The low lands of our eastern coast are exposed to the full power of the cold north-east wind of spring, which also sweeps unchecked over the central plain of England and settles down at night, with aggravated severity, in the valleys of the Trent and the Thames. If it blows long enough, it falls over the brow of the Cotswolds on the Vale of Berkeley, sweeps through the gorges of our western hills, and then mingles with the warm air of the Atlantic coasts, where the warmth from the sea materially alters its character. The great cold from the east wind on the 23rd of December, 1860, produced a minimum temperature in the valley of the Trent, near Nottingham, of 8° below zero; in the valley of the Thames 3° below zero. At Truro the lowest reading of my thermometer was 13°, and at Tresco Abbey, in the Scilly Isles, it was 24°. Thus in a period of extreme cold the warmth communicated from the sea maintained on our western coast a temperature of 32° above that of the eastern lands.

The weather of January last affords us an instructive example of the influence of these winds on climate and their effects on agriculture. The new year dawned in a perfect calm; but on the 2nd, 3rd, and 4th, with a north-easterly wind, the whole country was covered with snow to an average depth (in Cornwall) of 6 inches. The thermometer marked at Datchet 8°, Staines 7°, Wallingford 5°, all below zero; at Penarth, Truro, 26°, and at Tresco Abbey, Scilly Isles, 33°. The wind gradually veered to the south-east, when a storm of unexampled fury burst on the

south-western coast of England, accompanied with torrents of rain: my gauge measuring 2·18 inches—the largest quantity I ever registered in 24 hours. Before evening the wind and rain had ceased and the snow had disappeared. During the night of the 5th the wind further shifted to the south and south-west, and the morning of the 6th was calm and clear, and as mild and balmy as May. The thermometer at 9 A.M. stood at 50°, and so powerful was the influence of the westerly winds in driving back the invasion of cold, that the average temperature of several following days was 55° (the then temperature of the air in mid-ocean) and of the nights 45°, and the genial warmth penetrated the whole country.

A second period of extreme cold followed. On the 10th of January the wind from the north and east again set in, bringing Arctic cold over western Europe and covering the land with a mantle of snow. In the east of England the thermometer fell to zero, and the long continuance of winds from the north and north-east penetrated the western counties, producing there an unusual degree of cold. On the night of the 14th my minimum marked 11°; in the valley at Truro it registered 8°, and on the granite hills of Alternun 4°. But the air was dry, the sky clear, and, with a gentle wind, the weather was enjoyable. Again the wind passed ominously to the east, when clouds above and gusts of wind below gave indications of the gathering storm. On the 20th the wind further veered to east-south-east, and from this fatal point it again blew a hurricane, sweeping across the entrance of the English Channel; it reached its maximum of intensity at 4 P.M., and died out at night.

The exhausted wind, still following the course of the sun, passed to the south-west, and the country became suffused with warmth and loaded with humidity; the chilled walls of the houses, precipitating the moisture, ran with water; the temperature of the rooms in my house, without fire, was 44°, but in the open air, at 9 A.M., it was 53°. On going out to read the thermeters I felt as if passing into a heated room: the air was hot and filled with fragance exuding from the burst sap-vessels of the trees wounded by the alternation of frost and heat; the scent from a Cupressus was very powerful and extended to full 50 feet around it.

The wind from the north-east usually comes with a gentle current, under a clear sky, and penetrates but slowly westward. But the south-west wind comes like a mighty giant, clothed with heavy clouds and dripping with moisture. He stalks with his warm breath through the land, and the snow falls in heavy lumps from the boughs and fades rapidly away from the hill-

sides most exposed to his influence; so that lines of temperature might be drawn on the delicately-shaded surface; and between night and morn the snow-cold mantle of winter is gone, and the emerald-green of spring returns with the thermometer at 50°.

The severe cold of last winter enabled me to examine the effects of a covering of snow on the soil and the protecting influence it gives to the wheat-plant. To this end I placed three minimum thermometers (first tested by a Kew standard) as follows:—No. 1 on the surface of the grass under 4 inches of snow; No. 2 in the air, an inch above the surface of the snow; No. 3 four feet above the ground. During the whole of the cold period No. 1 remained very closely to the freezing-point, 32°; No. 2 fell to 10°; No. 3 to 15°. Thus the air on the surface of the snow was 5° colder than 4 feet above it, and the surface of the soil was full 20° warmer than the surface of the snow. Thus a coating of only 4 inches of snow so repelled the cold that there was a difference of 20° between the two sides of the thin snow-bed: an amount of heat equal to the difference of the mean temperatures of January and July in Cornwall.

We may, therefore, arrive at the conclusion that a covering of snow tends greatly to shelter young vegetation during periods of great cold, and that its beneficial effects in this respect have rather been underrated than otherwise.

The steadiness of the temperature under the snow, compared with that of the air, further tends to protect the plants; of which the sap-vessels of vegetable fibre are burst and disrupted by the variations of frost and thaw. If a frozen blade of wheat be held between the eye and the sun, the ruptured state of the vessels may be distinctly seen. In this respect also snow is a great preserver.

It was found that the air on the upper surface of the snow at night was intensely cold, and when this cold is intensified by a wind from the north-east, cattle and sheep—especially young stock—exposed in the open field to its influence must suffer both in constitution and in weight. Heat is, to some extent, an equivalent for food, and an exposure to such a low temperature will often do more injury than many weeks of generous feeding will restore. Shelter should be provided by straw-yards and open linhays.

The amount of damage done by the cold and snow of January last to the early vegetable crops of the west of Cornwall exceeded 20,000*l.*

The three periods of great cold in the past winter were each followed in the south-west of England by heavy and most de-

structive storms from the south-east. The north wind which preceded each, and brought the cold, gradually passed to the south-east, and when it reached that point it was intensified into a hurricane of extreme violence. In Torbay alone, in 1866, forty vessels were wrecked by a similar gale, and in the storms of 1867 the damage must have been far greater on the south-western coast.

We may infer—

That cold, especially when accompanied by snow and continued frost, is, in the south-west of England, a storm-breeder.

That after severe cold of many days' standing in winter, heavy gales may be expected; and when at such a time northerly winds shift to east and south-east a storm is near.

The strong winds, by drifting the snow, were destructive to many flocks of sheep in the western counties; and the young wheat was much injured on exposed ground by the protecting covering of snow being swept away by the wind.

Wet Julys.—The harvest months of July and August are in this country a time of anxiety to the farmer. He may previously have expended skilful labour and money to raise a vigorous plant: he can do no more, and now trusts to the weather to crown his labour by perfecting the grain; but a cold June and a wet July are sadly disappointing to his hopes, and the wheat-crop, in particular, suffers from this defect of heat and excess of rain. These harvest months are very variable as to winds, temperature, and rain, and corresponding effects are produced on the crops. The south-west wind is at this season three times as prevalent in some years as in others. The mean temperature has ranged at Penarth from 68·6° in 1859, to 60·1° in 1860: the former year giving an early and abundant harvest, and the latter a scanty crop gathered amidst the wet weather of August and extended throughout September. Thus a difference of 8° of temperature in July made a difference of full six weeks in the ripening of the corn; and my rain-gauge has measured three times as much rain in one July as in another.

The cause of the wet character of July must be traced to the south-west wind, which reaches the maximum of prevalence in this month, and its variable weather to the inconstancy of the winds.

The south-west wind at this season sweeps the abundant vapour from the surface of the sea, and arrives, laden with moisture, on our western shores at a temperature of 58° to 60°,—

very nearly equal to the mean heat in the air over the land; but, driven onwards over the hilly surface of the western highlands, it meets with a colder stratum, and the chilled night air also tends to condense the vapour and produce an abundance of rain. In such a season cloud on cloud rolls in from the west till masses of vapour obscure the sun, which day after day no ray of his can pierce; then, long pendant streams of condensing vapour float over the languishing ears of corn, or descend in heavy rain to injure and retard the harvest.

But there are seasons when, under the influence of the clear sky of the east wind of spring, the soil becomes so heated by the solar rays that the radiation of heat from the land becomes more than a match for the vapour from the sea. The sun has obtained the mastery, and it gives him the means and the power to maintain it. Then the summer is of the most genial character, and the heat is tempered by the fresh balmy breeze from the west. Such was the July of 1859, when my thermometer in the shade by day generally stood at 80°, and once, on the 12th, at 94°. The wheat harvest began on the 20th, and before the end of the month much corn was cut. August commenced with heavy rain: upwards of an inch fell in one day, and the highly-heated soil became a hotbed of wondrous activity.

The effect of the north-east wind of spring on the temperature of the succeeding summer is well illustrated by this great heat in 1859. In that year, during the whole of February and March, the wind was from the westerly points of the compass; but late in April the return current from the north-east set in and continued with great constancy throughout the whole of May, and in this month not a single point of westerly wind was marked by the vane at Greenwich. The following months of June and July were respectively 2·2° and 6·2° above their average temperature. The masses of vapour which the winter winds had rolled in from the Atlantic had been driven back by the steady persistency of this dry wind from northern Europe; the sky was kept clear of cloud and the sun's rays fell unobstructed on the heated soil, the radiations from which so warmed the air that the summer humidity from the sea was absorbed by its higher capacity for moisture, and invigorating open sunshine continued throughout most of the summer. At such a season I have seen the mist and clouds from the sea "eaten up" by the warmer air over the land. The westerly wind brought the visible moisture to the line of contact with the warmer air on the Cornish coast; but there it broke into streaks of white vapour, and disappeared like the steam from the funnel of a railway locomotive engine.

When the north-east wind sets in early in March, after blowing a season, it restores the balance of the atmosphere, and the reflux wind from the south-west commences before the heat of spring has been felt; then heavy rain and evaporation chill both the soil and the air, the genial warmth of summer is retarded, and the continuous rains injure the corn-crops and flood the valleys. Thus in 1856, after the north-east wind was exhausted in the middle of May, the south-west wind began to blow with great power, and penetrated far into western Europe. In France, especially, the Seine, the Loire, and the Rhone were flooded, towns and lowlands were inundated, houses and bridges swept away, and a large amount of life and property destroyed.

Effects of Sea-temperature on the Climate.—These effects are principally manifested in a high winter temperature, and in the abundance and distribution of rain. The greatest influence of the warmth from the Atlantic on our shores is felt on the south-western coasts of both England and Ireland; and I have therefore been led carefully to examine the peculiar climate of the Scilly Isles, surrounded by the warm water of the sea and open to the full effect of the south-west wind, twenty miles beyond the Land's End. I obtained from St. Agnes' lighthouse a set of observations extending over twelve years; Mr. Moyle, of St. Mary's, kindly undertook to register day and night thermometers, and has sent me returns for six years. The results reduced to monthly means and compared with the mean temperature for fifty years at Greenwich are as follows:—

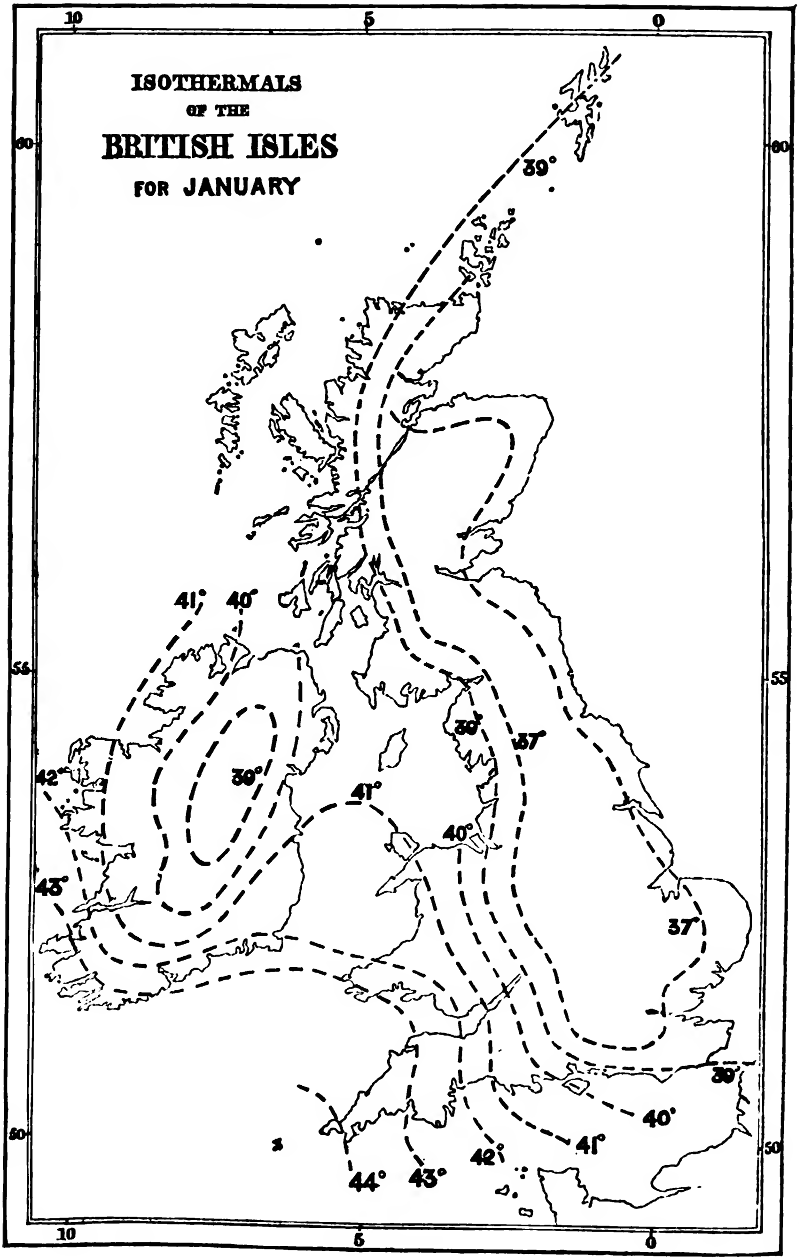
TABLE V.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Scilly Isles.	46·3	45·8	46·3	47·7	52·8	57·6	60·2	60·5	58·8	53·7	50·5	48·0	52·35
Greenwich .	36·9	38·7	41·6	46·2	52·9	59·1	61·8	61·2	56·6	50·2	43·1	39·8	49·0

Thus the mean temperature of the islands exceeds that of Greenwich by $3\frac{1}{2}°$, and in the month of January the mean heat at Scilly is $9\frac{1}{2}°$ above that of the neighbourhood of London.

The temperature of the air upon the Atlantic which the south-west wind sweeps over our coasts in January is about 52° before it is reduced by the colder air of the land; and the effect of winds from other quarters is to cause a decline of warmth of 6° at Scilly and 8° on the south-west of Ireland.

The following Table shows the relative amount of heat at the places mentioned during the winter months:—



ISOTHERMALS
OF THE
BRITISH ISLES
FOR JANUARY
10
5
0
60
55
50
39°
41°
40°
39°
41°
37°
42°
43°
40°
37°
39°
40°
41°
42°
43°
44°

TABLE VI.

	December.	January.	February.	Mean.	Years.
Scilly Isles ..	48°·0	46°·3	45°·8	46°·7	12
Cork ..	42·8	43·9	44·5	43·7	10
Sandwick (Orkney) ..	41·0	39·6	38·4	39·7	7
Penzance ..	45·2	42·6	44·9	44·2	21
Exeter ..	42·3	41·0	41·1	41·5	10
Greenwich ..	39·8	36·9	38·7	38·5	50
Edinburgh ..	39·7	37·4	38·2	38·4	17
Montpellier ..	45·7	42·1	44·8	44·2	11

From this table it appears that during the three winter months Penzance has a temperature precisely the same as that of Montpellier; Cork falls short of it by only half a degree; and the heat of the Scilly Isles exceeds this noted winter resort by 2½ degrees.

At this season Edinburgh has the same amount of heat as Greenwich, although 350 miles further north; and yet 200 miles further, at Orkney, the winter temperature exceeds that of Greenwich by one degree. But figures do not represent so vividly the geographical distribution of heat as lines of equal temperature; and the accompanying sketch-map shows at a glance that our winter-warmth comes from the sea on the west. The lines cluster on our western coasts and truly represent the waves of heat which in winter sweep in from the Atlantic, each wave being warmer than that which preceded it. For these lines of equal temperature (isothermals) I am indebted to an excellent meteorological work by the Secretary of the Scottish Meteorological Society, and I gladly avail myself of his description of the effect of the Gulf Stream on our winter temperature, as it confirms the opinion I so strongly expressed in an essay in the 11th volume of this Journal: — "The Gulf Stream leaves its impress unmistakably on the temperature of each of the months, as shown by the position of the monthly isothermals. In winter the deviation from their normal or east and west direction is greatest. Indeed, as regards Great Britain, the lines are then at right angles to this normal direction, and lie north and south. In Ireland they seem to envelop the island with their folds, which increase in warmth from the centre of the island outward to the ocean. This points out clearly that the great source of heat from which the climate of Great Britain derives its warmth is in the west; in other words, it is regulated by the ocean." *

This winter warmth is first suffused along the western coast-line

* 'A Handy-Book of Meteorology,' by Alexander Buchan, M.A.

and then sweeps up the valleys which open on the south-west to the sea. A glance at a geological map will show that all the older rock-formations have in these islands a general strike from the north-east to the south-west, and thus govern the direction of many open valleys and mountain chains. This is particularly the case in the south-west of Ireland, where the valleys and bays open funnel-like to the sea; and on the west of Scotland the Firths and Lochs have a similar arrangement. In England the bell-mouthed Severn opens up a passage for the warm wind to the middle of the country.

The flat surface of the middle of Ireland enables the westerly wind to have a clear sweep over most of the island; it afterwards sheds its heat on the plain of Cheshire, and deluges the Cumberland mountains with rain.

The hills which constitute the backbone of England form a dividing wall of climate, which may be traced from the Cotswolds northward along the crests of the Pennine range to the Cheviot hills. On the west of this line we have the warmth and humidity of the ocean, on the east the dry air and greater summer-heat of the Continent. It is a wall which, so far as climate is concerned, divides the arable field from the grazing lands of England: on the one side there is a preponderance of corn-growing power, on the other of meat-producing capabilities. The texture of the soil and the demand at the market may modify this conclusion; but other things being equal, submission to the teaching of climate will in the long run be found the safest and most profitable course for the farmer to pursue.

After the end of April and during the summer months the British Isles receive no warmth from the surrounding seas; but the wide ocean on the west then produces a contrary effect. As the great wave of summer-temperature sweeps northward over Europe, it is retarded by the cooler air from the sea on the western coasts, where the isothermals are bent southward along the coast-line from Denmark to Belgium.

The amount of heat which in July rests on the south of England is on the Continent extended further north than St. Petersburg; and in this month the summer-heat is as great at Tornea and Archangel as at Edinburgh.

The comparatively low temperature of the water of the German Ocean in summer tends also further to reduce the influence which the high summer temperature of Central Europe would otherwise exert on the eastern plains of England; but any defect of our climate due to this cause is more than compensated for by the equality of temperature and steady downfall of rain which we enjoy, and which give a capability of productive power to the soil of England far greater than the dry summer-heat of the Continent could bestow.

The Amount and Distribution of Rain.—Thus far we have traced the winter warmth and humid wind from their birthplace on the ocean to our western shores: it remains to show the manner in which the vapour is condensed into rain, and its unequal distribution over the broken surface of the country. This subject demands a more searching investigation than it has hitherto received, and good recorded observations of rainfall have so multiplied during the past ten years, as to supply in all necessary details its amount and distribution through the year. Indeed the difficulty now is to reduce the formidable amount of figures within judicious limits, and into such an arranged form as will best convey a full knowledge of this element of our climate, without cumbering the Tables with superfluous matter. To this end I purpose to work out the results of observations on rainfall which I commenced in the south-west of England twelve years ago, and to apply the deductions therefrom more generally to other parts of the country, keeping in view, without tabulating in detail, the observations which cluster in other districts, and taking also into consideration the physical contour of the surface and its exposure to the rain-bearing wind.

In 1855, with the co-operation of several gentlemen and some ladies (who proved excellent observers), I established the following lines of rain-gauges, the stations being selected with reference to exposure and altitude. One line of gauges extended from the Scilly Isles through Cornwall to Dartmoor, and from thence, with the aid of other observers, to the Eastern counties; a second from the lowland at the estuary of the Taw, Devon, over part of Exmoor, to the vale of Taunton and the Blackdown hills; and a third from the sea at Brentmarsh, by the Mendip hills and Frome to Salisbury Plain. The daily readings of the gauges were sent me monthly, and they are reduced in the following Table and combined with such other records of rainfall as would work into the lines. I have further added the monthly means from other important stations, so as to give a complete and general view of the distribution of rain throughout the year over the whole kingdom. (See Table VII., pp. 58-61.)

The generally received opinion that more rain falls on the western hills than on the eastern plains is fully confirmed by these rain-gauge investigations; but even those who have given much attention to the subject have rather underrated than otherwise the relative amounts and the enormous quantities which fall on the western hills.

In the year 1866, while about 25 inches fell on the eastern lowlands, on the hills of North Wales the amount measured was 127 inches; on the Cumberland mountains 224 inches; and on the western Highlands of Scotland 144 inches.

The

TABLE VII.—SHOWING the Average Monthly Quantity

Place.	Height in Feet.	Jan.	Feb.	March.	April.	May.	June.
FROM THE SCILLY ISLES TO NORWICH.							
St. Mary's, Scilly	50?	3·3	2·0	1·9	2·5	1·9	1·9
Sawah (Land's End) ..	200?	2·8	2·6	3·1	2·6	1·8	1·8
Penzance	..	3·8	3·3	3·9	1·8	3·0	2·1
Helston	115	3·5	3·0	3·2	1·9	2·4	2·3
Truro (Roy. Inst.)	55	4·5	2·9	3·1	2·8	2·6	2·8
Falmouth	120	4·3	3·9	3·0	2·5	2·4	2·2
Newquay	100?	2·0	1·9	1·9	2·1	2·6	1·8
Treharrock	303	3·3	1·9	2·6	2·5	2·9	2·9
Bodmin	290	4·2	3·2	2·7	2·3	3·9	2·8
Roughtor Consols	1100?	6·1	4·7	1·7	6·9	5·4	4·6
Tavistock	273	3·1	3·1	3·1	1·9	2·9	2·9
Prince Town, Dartmoor	1400	6·6	3·1	5·0	5·3	4·6	5·2
Goodamoor, Dartmoor ..	580	6·1	3·6	4·6	2·9	4·2	4·7
Exeter	150	3·1	2·5	2·3	2·4	2·1	2·2
Sprydoncote	..	2·1	1·8	2·3	3·8	2·0	1·7
Itchen Abbas	..	2·1	1·3	1·5	1·6	2·3	2·6
Cobham	80	1·7	1·4	1·3	1·7	1·9	1·7
Chiswick	24	1·6	1·7	1·3	1·7	1·8	1·8
Greenwich	158	1·7	1·5	1·4	1·7	2·0	1·8
Epping	365	1·8	1·8	1·7	1·8	1·9	2·1
Norwich	39	2·0	1·6	1·3	1·7	2·1	2·0
FROM THE TAW LIGHTHOUSE, DEVON, TO TAUNTON.							
Taw Lighthouse	20	2·0	1·8	0·8	0·8	1·6	3·7
Barnstaple	20	3·6	2·3	3·0	2·3	2·2	2·7
Chawleigh	350	2·3	1·5	3·4	4·1	2·5	3·0
Castle Hill	310	3·4	1·9	3·1	2·3	2·8	4·6
Witheridge	700	3·2	2·3	3·0	2·9	2·7	3·4
Huntsham Court	560	4·1	3·0	4·7	3·4	4·3	4·1
Taunton	50	2·1	1·7	2·2	2·0	2·2	2·7
Otterhead..	880	3·8	2·2	3·4	4·7	2·7	3·8
FROM THE COAST AT HIGHBRIDGE, SOMERSET, TO SALISBURY PLAIN.							
Highbridge	10	1·4	1·4	1·6	1·9	2·7	2·1
Wedmore	20	1·5	1·8	1·7	2·5	2·7	3·0
Mells..	300	1·8	1·5	1·0	1·6	3·1	3·7
Marston Bagot..	300?	2·3	1·5	1·8	2·5	2·7	2·4
Chapmanslade	350?	2·1	1·7	2·0	2·8	2·6	1·9
Chiltern-All-Saints	400?	1·8	1·2	1·5	2·3	2·2	1·6
ENGLAND AND WALES—THE WEST COAST AND HILLS.							
Lampeter (Wales)	425	4·6	2·6	3·6	2·2	2·6	4·5
Haverfordwest (Wales) ..	60	5·1	2·7	3·8	1·9	2·2	4·4
Ystalyfera (Wales)	368	5·9	2·9	4·9	2·8	3·5	6·7
Liverpool	37	1·7	1·4	1·4	1·4	1·4	2·7
Whitehaven	90	5·1	3·4	2·5	2·2	1·9	3·1
Seathwaite	..	17·9	13·7	7·7	7·6	5·6	8·0

of Rain in Inches at the following Places.

July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	
1·3	3·2	2·9	3·7	2·6	4·2	31·4	4 years.
1·9	2·1	2·8	3·5	2·4	3·7	31·1	6 years.
2·9	3·5	3·4	5·6	5·2	6·0	44·5	7 years. .
2·4	2·9	2·9	4·1	4·0	3·7	36·3	10 years.
2·6	3·4	3·9	4·4	5·0	4·7	42·7	25 years, 1839 to 1863.
2·8	2·9	3·4	3·8	5·5	4·3	41·2	15 years, 1837 to 1851.
2·0	1·4	1·5	3·4	1·4	2·5	24·5	3 years, 1855 to 1857.
2·7	2·4	3·3	5·2	2·6	3·9	36·2	8 years.
2·6	2·7	3·6	5·7	4·2	3·1	41·0	6 years.
4·0	5·1	7·1	5·8	3·1	6·4	60·9	1856.
2·7	3·3	3·6	4·8	4·9	3·6	39·9	6 years.
3·2	5·3	6·2	6·8	4·0	6·6	61·9	7 years.
3·8	5·3	5·4	5·7	7·1	5·1	58·5	12 years.
2·2	2·2	2·7	3·7	3·7	3·5	32·9	45 years, 1815 to 1859.
1·9	2·6	2·7	3·5	2·0	2·8	29·2	4 years, 1856 to 1859.
2·1	2·8	3·0	4·4	2·3	2·6	28·6	6 years, 1854 to 1860.
2·4	2·2	2·4	2·8	2·3	1·6	23·7	35 years, 1825 to 1857.
2·3	2·5	2·6	2·6	2·4	1·5	23·8	25 years, 1826 to 1850.
2·7	2·6	2·4	2·9	2·4	1·8	24·9	40 years, 1820 to 1859.
2·4	2·5	2·7	2·9	2·6	2·1	26·3	30 years, 1822 to 1851.
3·0	2·7	2·4	2·8	3·0	1·8	26·5	11 years, 1850 to 1860.
3·0	2·1	2·3	3·8	0·8	2·0	24·7	2 years.
2·9	4·0	4·7	3·9	4·3	4·7	40·6	9 years.
3·1	2·9	3·6	4·8	2·5	3·3	37·0	3 years, 1857 to 1859.
3·3	4·2	4·4	5·4	3·7	3·9	43·0	8 years.
3·6	3·8	3·0	5·1	2·9	3·6	39·5	
3·9	4·4	3·9	4·3	3·6	4·4	48·1	5 years.
2·5	2·2	2·2	3·5	2·2	2·2	27·7	
3·0	3·5	3·7	4·7	3·5	4·5	43·5	
2·3	1·9	1·7	3·8	1·0	1·6	23·4	2 years, 1855 and 1856.
2·2	2·6	1·8	4·0	0·8	1·7	26·3	Ditto.
2·1	2·0	1·8	4·9	1·7	2·6	27·8	3 years, 1854 to 1856.
2·6	2·6	2·6	5·1	0·8	2·0	28·9	3 years, 1855 to 1857.
2·6	2·3	2·9	4·3	1·5	2·5	29·2	5 years, 1855 to 1859.
2·1	1·8	2·0	3·9	1·0	2·0	23·4	4 years, 1855 to 1858.
4·2	3·8	4·9	5·2	4·4	4·2	46·9	4 years, 1860 to 1863.
3·2	5·5	4·0	4·9	5·4	4·5	47·6	Ditto.
5·8	7·9	6·9	7·5	6·0	5·8	66·6	
2·8	3·4	2·2	2·9	1·9	2·1	25·3	9 years, 1852 and 1860.
4·3	4·3	3·1	5·3	4·5	3·8	43·5	10 years, 1844 to 1853.
13·3	12·5	7·1	16·6	15·5	14·9	140·5	9 years, 1845 to 1853.

TABLE VII. *continued*—SHOWING the Average Monthly Quantity

Place.	Height in Feet.	Jan.	Feb.	March.	April.	May.	June.
ENGLAND — THE EASTERN SIDE.							
York	50	1·8	1·2	1·3	1·4	1·7	2·2
Nottingham	203	2·2	1·3	1·2	1·6	2·0	2·8
Bedford	100	1·9	1·0	1·1	1·4	2·1	2·4
Oxford	210	2·0	1·8	1·8	1·9	2·2	2·3
Hitchin (Herts)	400	2·3	1·2	1·0	1·8	2·3	1·9
SCOTLAND — THE WESTERN SIDE.							
Rhinns of Islay	74	0·6	1·3	2·6	1·9	4·2	2·2
Glengyle (head of Loch Katrine)	380	9·2	8·6	7·4	5·0	5·3	6·5
Ben Lomond (head of Bucray Valley)	1800	8·5	6·5	7·5	4·2	5·5	6·9
Torosay Castle (Isle of Mull)	18	10·2	8·7	8·3	5·0	5·4	5·4
Portree (Isle of Skye) ..	60	13·9	12·7	10·5	6·0	6·2	4·6
Barrahead	640	3·6	1·2	2·7	2·7	2·4	2·7
Pentland Skerries	72	3·0	1·4	1·9	1·4	2·5	2·4
Sandwick (Orkney) ..	78	3·6	1·9	3·1	1·9	2·4	1·5
Bressay (Shetland)	20	4·6	2·6	4·3	2·2	2·7	1·3
SCOTLAND — THE EASTERN SIDE.							
Dunrobin Castle	6	2·7	2·1	2·4	1·5	1·4	2·0
Aberdeen	100	3·2	1·5	2·5	1·5	2·1	2·8
Castle Newe (Aberdeenshire)	930	2·6	2·6	2·3	2·0	2·3	2·5
Dundee	60	3·4	1·3	2·0	1·0	2·0	3·7
Haddington	..	2·0	1·7	1·5	1·1	1·7	2·5
Deanstone House (Stirling)	..	4·6	3·5	2·5	1·8	2·0	2·8
Carbeth (11 miles N.W. of Glasgow)	..	3·6	3·4	3·1	2·2	2·5	3·3
IRELAND.							
Cork	60	4·5	3·3	3·2	2·5	2·2	2·1
Valentia	50	7·0	3·7	5·9	3·3	2·5	4·0
Limerick	65	3·4	2·3	2·9	2·5	2·1	2·3
Ennis	..	5·4	2·6	2·3	2·0	2·8	4·0
Galway	35	7·9	3·6	2·2	2·0	2·1	3·8
Killaloe	123	5·2	2·7	5·1	2·8	3·0	4·0
Markree	146	3·9	2·3	2·6	2·5	1·8	3·3
Belturbet (Cavan)	190	4·5	2·8	2·4	1·7	2·2	3·8
Armagh	235	4·1	2·5	2·3	2·6	1·9	2·7
Toome	60	3·9	2·0	1·7	1·2	1·8	2·8
Belfast	55	3·3	2·2	2·2	2·9	1·0	2·7
Dublin	19	2·4	2·1	1·5	2·1	2·2	2·3

of Rain in Inches at the following Places.

July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	
2·6	3·2	2·3	2·2	1·9	1·6	23·4	9 years, 1852 to 1860.
2·3	3·6	2·6	2·9	2·2	1·6	26·3	Ditto.
2·3	2·9	1·7	2·5	1·8	1·2	22·3	Ditto.
2·5	2·6	2·7	2·6	2·5	2·2	27·2	25 years.
3·2	2·7	1·9	3·1	2·2	1·4	25·0	10 years, 1850 to 1859.
3·4	2·1	1·3	6·1	3·5	5·3	34·5	1862 (average year).
5·2	7·1	6·1	10·0	5·1	11·7	87·5	7 years, 1854 to 1860.
5·7	8·2	7·7	11·1	5·2	10·1	87·3	Ditto.
4·0	8·6	7·8	11·4	7·2	10·6	92·6	
6·4	8·6	10·8	13·4	12·5	16·9	122·5	4 years, 1860 to 1863.
1·4	2·6	2·8	3·2	3·2	2·7	31·2	2 years, 1862 and 1863.
1·4	2·2	1·8	2·4	1·7	5·9	28·0	Ditto.
2·0	4·2	4·0	5·2	4·0	4·2	38·0	4 years, 1860 to 1863.
2·1	3·4	4·1	5·7	3·4	5·3	41·7	Ditto.
1·8	2·9	2·9	3·0	2·5	2·7	27·9	Ditto.
1·7	3·8	2·4	2·4	3·1	3·3	30·3	Ditto.
3·1	3·9	3·1	3·1	3·6	2·6	33·7	30 years,
2·4	3·7	2·6	2·1	2·9	3·2	30·3	4 years, 1860 to 1863.
2·5	2·6	2·4	2·9	2·3	1·7	24·9	30 years, 1835 to 1864.
3·3	3·3	2·0	3·7	4·2	4·0	37·7	15 years, 1841 to 1855.
4·1	4·0	3·6	4·3	4·0	4·3	42·4	46 years, 1814 to 1859.
2·6	3·2	2·5	3·9	5·0	5·2	40·2	10 years.
3·6	7·4	7·0	8·2	7·1	6·2	65·9	3 years, 1861 to 1863.
3·2	3·8	2·8	3·4	3·9	2·3	34·9	7 years, 1840 to 1846.
3·3	3·3	2·2	4·4	3·1	4·1	39·5	6 years, 1851 to 1856.
4·2	3·5	2·8	3·9	3·5	4·5	44·0	Ditto.
3·6	6·0	4·6	5·6	4·6	3·6	50·8	4 years, 1860 to 1863.
3·4	3·4	2·7	3·5	2·7	4·1	36·2	9 years, 1851 to 1859.
4·2	4·2	1·8	4·1	2·9	3·9	38·5	6 years, 1851 to 1856.
2·8	2·9	2·3	2·7	3·0	4·0	33·8	9 years, 1851 to 1859.
2·8	3·3	2·1	2·5	3·3	2·7	30·1	5 years, 1851 to 1855.
2·7	2·8	2.1	2·8	2·6	3·3	30·6	9 years, 1851 to 1859.
2·8	3·0	2·3	3·0	3·0	2·3	29·0	16 years, 1837 to 1852.

The inferences from the rain table clearly show that the rain wind comes from the south-west, and thus the western coast line is fully exposed to its influence; but, confirming every point as we pass, by actual observations, we give the rain deposited by different winds on the west and east of these islands.

TABLE VIII.—SHOWING the Quantity of Rain in Inches which falls in the South-West of Ireland, and in Suffolk, with the Wind at the several points of the Compass, for One Year.*

	S.	S.W.	W.	N.W.	N.	N.E.	E.	S.E.	Total.
Toomavara	4·2	12·7	8·2	2·6	3·1	3·1	3·1	3·5	40·5
Monk's Eleigh	2·7	2·7	4·4	2·4	2·8	2·0	3·1	1·7	21·8
Toomavara, mean of 5 years	6·6	10·6	6·0	2·8	2·3	2·2	2·2	3·2	35·9

Thus at Toomavara half of the whole amount of rain fell with the west and south-west winds; but in Suffolk, from its contiguity to the German Ocean, the rainfall is more equally apportioned to the winds from the other points of the compass.

It must, however, be considered that the rain-bearing wind is almost wholly from the south-west: the other winds rather act as condensers to deposit the moisture, than as carriers to bring it. Thus in Cornwall it very commonly happens that heavy but transient rainfall takes place on a sudden shifting of the wind to the south-east, and on referring to my register of the weather for the past fourteen years, I find that there were forty-five days in which the amount collected exceeded an inch, and in the majority of cases the heavy rain was thrown down by a south-east wind. Only twice during the same period did an inch of rain fall with a north-west wind, and eleven times with the wind at the south-west.

From this cause, and especially on our eastern lands, the moisture is often condensed so as to fall as rain, not under the action of the wind which brought it, but by a shift of the wind bringing a current from a colder region.

In tracing the rainfall over the rugged surface of the land we find great variation in the quantity—often within short distances—resulting both from the relative elevation of the land, and the configuration of its surface.

At the Scilly Isles, and at the Land's End, before the rain-clouds are much disturbed by land influences, the annual quan-

* Transactions of British Association for the Advancement of Science, 1843 and 1845.

tity of water deposited on the land is about 31 inches; over the varied surface of Cornwall below 300 feet in height, it is about 40 inches; driven up the slope of the granite hills of Bodmin Moors, where the clouds are first heavily tolled at heights from 1000 to 1400 feet, it increases to 60 inches. The low undulating country from Liskeard to Tavistock receives about 40 inches. Thus the rain clouds arrive at the great granite boss of Dartmoor, rising into hills from 1000 to 2000 feet in height, by which time they are partly drained of their contents, but still yield from 60 to 80 inches at different stations on the moor; curiously enough the wettest part yet ascertained being at Holme, on the eastern side of these hills. The low lying, rich, new red-sandstone soil of the Vale of Exeter is, however, greatly protected from excessive rainfall by the Dartmoor hills, the yearly amount of rain at Exeter decreasing to 33 inches.

Along the low and open parts of the north-west coast of Cornwall and Devon, very much less rain falls than inland, and the barley grown on these districts is good in yield and quality; hence we may infer that, as only from 24 to 30 inches fall on these parts of the coast line, a few miles out at sea beyond the influence of the land, the rain is but little in excess of that on the eastern lands of England.

Again, tracing the rainfall from the wide, open, and flat estuary up the Taw, where about 25 inches annually fall, as the valley contracts at Barnstaple, the quantity increases to 40 inches, and to upwards of 60 on the skirts and high land of Exmoor.

On the southern slope of these Exmoor hills there exists that peculiar combination of soil and climate which gives origin to the North Devon breed of cattle. In this district, the amount of rain at Castle Hill, on the west, is 43 inches; and at Huntsham Court, on the east, 48 inches. The soil is a friable brown loam, from the upper beds of the old red-sandstone; and the country is moulded into almost continuous hill-side slopes, and narrow valley flats lying from 400 to 800 feet above the sea. The climate is not favourable to the perfecting of the wheat crop, but the steady downfall of rain produces an abundance of warm, deep-seated springs, which supply the water for the catch-meadows of the hill-side, and the productive water-meadows of the valleys. The mountainous structure of the country, the abundant rainfall, the warm winters and cool summers, with the rich, sweet pasture of the sheltered combes and the hill-side meadows, give that activity of limb, beauty of form, soft silky skin, and aptitude to fatten, which characterise this favourite mountain breed.

Continuing our survey of the rainfall, we find the gauge recording 44 inches at Otterhead, on the Blackdown Hills, 850

feet above the sea; and on the low lying lands at Taunton 28 inches.

The favoured vale of Taunton Dean, defended by the Exmoor hills on the west from excessive rainfall, has a high summer temperature, and a rich red-sandstone soil. Sheltered by hills on every side, it may be considered the wall-garden of the west, and when loaded with autumn fruit and corn, and the pastures studded with heavy cattle, it looks like a picture of agricultural plenty set in a frame-work of massive hills.

The third line of gauges, from the sea-coast at the Somerset marsh lands on the west, tells precisely the same story as the other lines. The rainfall from the sea inland increases 60 per cent. on the crest of the hills, which form the water-shed of the valley from Bruton to Shepton Mallet; the accumulation of rain from these upper slopes often floods and injures the rich marsh lands below, and overpowers the capabilities of the engineering works which have been constructed for the drainage of the levels. Such works should be adapted, not only to the actual rainfall on the land to be drained, but also to the floods resulting from the direction of the rain-bearing wind, and the condensing power of the neighbouring hills.

On the high chalk table-land of Salisbury Plain, and eastward to beyond Winchester, much less rain falls than would be inferred from a country lying at a height of from 400 to 600 feet above the sea. My gauge at Chiltern-All-Saints gave an annual mean of only 23 inches; and the returns obligingly sent me from Itchen Abbas, at the eastern end of the plateau, only 28 inches. Descending eastward to the low lands of the open valley of the Thames, the long-continued observations at Cobham, Chiswick, and Greenwich, give 24 inches as the average rainfall over a large area.

It appears that the unequal distribution of rain in the west mainly results from the difference of elevation of the land, and of the form and slope which the surface presents to the rain depositing wind. The warm, moist air is driven up the sides of the hills, and mingles with a colder stratum at a higher altitude; and as it approaches the line of contact the condensation becomes more rapid, and thus there is a large increase in the relative amounts near the head of the valley. We shall illustrate this by a few examples.

The south-west wind strikes into the funnel-mouthed bay of Carnarvon with great power, dropping from 30 to 40 inches of rain on the coast-line; passing up the valley to the foot of Snowdon at 330 feet high the amount is increased to 113 inches, and at 1300 feet to 127 inches; but it by no means follows that the depth of rain is proportionate to the height of the station;

on the contrary, a 1000 feet of height at one station gave only 58 inches of rain, and 1140 feet at another station 114 inches.

Considering that the whole range of the mountains from North to South Wales is exposed to the full effects of the westerly winds, the amount of water deposited on its 3000 square miles of elevated hills must be very great, and the water-power, if ever made available, is enormous.

These hills act as a breakwater to the aerial floods from the sea, and so drain the rain clouds of their contents, that in the broad rich valley of the Severn, and northward to the plain of Cheshire, only about 25 inches of rain falls annually. The rich pasture lands of the lias clay of Worcester lie low: a mountain rainfall would convert them into a worthless puddle.

The Cumberland mountains offer perhaps the best example of excessive rainfall, from 40 inches at Whitehaven on the coast, to 224 inches at the Stye, 1077 feet high. In this district a still greater disproportion is shown between the height of the station and the amount of rain, as in the following instances:—

Height of station (ft.)	36	247	422	695	1077	1985	2550	3300
Rainfall (in.)	40	102	197	90	224	139	91	68

The gauges have in this district especially shown the enormous ratio of increase of rain at the head of the valleys. In the same valley, near Buttermere, three gauges were placed only two miles between each, and the increase of the yearly amount of rain up the valley was respectively 76, 98, and 133 inches.

On the western coast of Scotland there are two important stations, on points of land running far out into the Atlantic, and beyond any influence from the Scotch hills, Barrahead and the Rhinns of Islay; here the rainfall, which must very nearly represent that on the open ocean, is about 31 inches, agreeing with that before mentioned at the Scilly Isles and the Land's End. But on the western Highlands the rainfall is tropical in its amount, and the quantity is greatly increased at the heads of the lochs and valleys; thus at the head of Loch Katrine the annual amount is 87 inches, and at Ben Lomond, 92 inches. And the stations along the western coast, appear to indicate that the whole range of the western mountains have an excessive amount of rain. There is, however, a more instructive example of a large annual rainfall in the Isle of Skye.

The ancient sedimentary rocks of the Highlands strike south-west, and many of the principal lochs and glens run in that direction, and thus the parallel ranges of hills present their ends to the south-west wind which sweeps along their sides; but Skye is almost wholly composed of Trappean rocks, and the crests of the hills, rising to 3000 feet, range north-west and

south-east, and thus present their sides across the strike of the rain-wind, and the result is that a deluge of 122 inches of rain falls, on an average of four years, at Portree. Passing from the mountainous district of the west to the sheltered and less elevated lands on the east, the great decrease in the rainfall is everywhere remarkable. At a small island in the Pentland Frith, 10 miles from the land (the Skerries), the annual fall is only 28 inches, and at Orkney it is not excessive.

An examination of the stations on the eastern coast of Scotland shows that there is a decrease in the annual quantity of rain in going southward, bearing a relative proportion to the decrease of sea temperature before described; thus at Aberdeen the yearly amount is 30 inches, and at Haddington 24 inches.

This decrease of rain on the eastern coast-line holds good far into the country, and even on land of considerable elevation. It will be seen from the excellent set of observations at Castle Newe, in Aberdeenshire, 930 feet above the sea and 35 miles from it, that the mean rainfall of 30 years is but 33 inches.

From the rich and wide Vale of York, down the eastern low lands, and over the central plain of England to Greenwich, there is a remarkably equal distribution of annual rain, which may be considered as averaging 24 inches; but raised here and there by being contiguous to land of greater elevation, and falling somewhat below that amount in parts of the inland plain. In this portion of England also, the highest summer temperature exists, and from these causes the climate is more adapted to the cultivation of hops than that of any other region in the British Isles.

There is, also, over this favoured district—the open corn-field of England—a great equality in all places in the distribution of rain throughout the year: the smallest quantity falling in spring and having its minimum in March, and the greatest amount in summer, reaching its maximum in July and August, and then seldom exceeding 2½ inches in a month,—an amount which does not injure the ripening of the corn crops, and is almost indispensable for turnip culture.

The westerly winds have in Ireland a clear sweep over the low bog region of the central plain and fall full on the Cumberland mountains, depositing from 44 to 30 inches in their passage across the island.

The observations at Valentia show that on the western coast-line of Ireland much more rain falls than on that of England, and the hill districts of Kerry and Galway must have a proportionately larger supply. From Dublin northward is the driest part of Ireland.

The distribution of the amount of rainfall throughout the

different months of the year undergoes a peculiar change in passing from west to east. At the Scilly Isles most rain falls in December and January. After striking the land the wet season is at Penzance partially extended into October; from thence, over the western hills, the greatest rainfall more fully clusters in October; and on the eastern plain the largest quantity falls in July and August. Thus while winter rain prevails in the west, summer rain is most abundant in the east.

The Effects of Climate on Agricultural Crops.—This subject I have before discussed in the 11th volume of this Journal, but not so fully as its importance demanded. My lack of service has, however, been ably supplied by two valuable papers contributed to the 20th volume by Mr. Russell, in which the climate suited to each particular crop is exhibited in considerable detail. It would be superflous again to go over the same ground, and I shall, therefore, only direct attention to the more prominent influences which our peculiar climate exerts on agricultural products.

It would however be entirely futile to attempt to dictate the course of cultivation which should be pursued in different districts from a consideration of climate only. I have endeavoured in this and in my former paper to examine and exhibit the principal elements which constitute the climate of the British Isles; the tables of temperature and rain, which I have with much labour obtained and reduced to a practical form; the warmth from the western ocean, with the prevailing winds and their effects, form the basis on which a knowledge of this subject must be founded; and any intelligent agriculturist mastering these leading facts, and taking into consideration any local peculiarities of elevation or exposure, would thus be enabled to adopt such a system of culture as the soil will best support and the climate mature.

I will only venture to repeat that the strong soils and high summer temperature of the middle and eastern side of England give to it such a preponderance of wheat-growing capabilities as must ever constitute it the great corn-field of England. This favoured country narrows in passing northwards, until high up the eastern side of Scotland it is reduced to a narrow strip of low-lying coast-land.

The western portion of Britain and the whole of Ireland have warm winters, cool summers, and a heavy downfall of rain, which constitute it a grazing country. Yet here there are many low-lying districts, with a moderate rainfall, on which wheat may be grown with advantage, and friable, warm soils, with a summer temperature, admirably adapted to perfect the barley-crop. But the land on most of the high ground should be held

as stock-farms, and such grain-crops only produced as may be necessary for the winter requirements of the cattle.

There is also the debateable ground between these extremes, on which the farmer mainly suffers from the effects of climate. Here the wheat-crop is often pressed beyond its climatic limits; in a hot and dry summer all goes well, but a cold July followed by a wet August rusts the stalk and withers the grain. I have often, as a surveyor, had to witness this lamentable loss of produce, and have seen many an industrious, honest man, with a hard-working family, struggle on through poverty and suffering in a course of culture which nature forbids. It was a slow run down hill, a battle against climate, where defeat is certain.

There are districts in the west where the course of culture has been gradually changed, and where stock-farming has now become general, and it has given an aspect of prosperous contentment to the homesteads and the people.

It has often been surmised, after a severe winter or a cool summer, that the unusual cold has resulted from the failing power of the Gulf Stream, or from an abundance of ice in the Atlantic, and a gloomy picture of the future has been drawn from the assumed gradual deterioration of the climate of these islands. It may be satisfactory to know that both history and science testify against such an apprehension. So far as history goes back into the past, we find the peculiarities of our climate the same as at present, as the following extract from Camden's 'Britannia' will show:—

"Minutius Fœlix saith, 'That Britaine though in want other whiles the aspect of the Sunne, yet refreshed it is with the warmth of the sea flowing round about it.' 'The seas,' quoth Cicero, 'stirred to and fro with the winds, do so wax warme, that a man may easily perceive within that world of waters there is inclosed certaine heat.' Tacitus says, 'No extremitie there is of cold,—the soile setting aside the olive and the vine, and the rest which are proper to warmer countries, taketh all kinds of graine, and beareth it in abundance: it ripeneth slowly, but cometh up quickly, the cause of both is one and the same, to wit, the overmuch moisture of ground and aire.'"

The great antiquity of the present ocean currents may be inferred from the amount of work which they have done in forming the Banks of Newfoundland,—the submarine moraine of the Arctic current. This current and its icebergs are the carriers which have brought the material from northern shores; but, on coming in contact with the warm waters of the Gulf Stream, the yearly fleet of icebergs are melted and their cargoes dropped on the ocean's bed. But this additional quantity within the historic period is so comparatively small that no appreciable extent of surface has been added to their bulk. The Grand Bank has an area larger than Ireland, and its great depth may

be inferred from the fact that at its southern termination, where it is brushed by the Gulf Stream, the slope of the sea bottom rapidly falls to the enormous depth of 5 miles. For unknown ages, therefore, in the past must these ocean streams have been at work.

As to the climatic future, no cloud of dismay need rest upon that. While the mountain-chain of the Andes in Central America remains to divert the warm current to our shores, and the ancient rocks of Russia form a barrier 1200 feet high between the White Sea and the Baltic, to keep back a cold current from the Arctic Ocean, no such alteration as that surmised can take place in the climate of this country.

It is also satisfactory to know that Mr. Glaisher, of the Royal Observatory, has examined and compared, with great skill and labour, the long series of meteorological observations of that institution, and which are now continued under his care. And in summing up his extended investigations he says, "The results are very remarkable. Large and continuous increases of temperatures are shown in the months of November, December, and January;" and he further shows that the mean temperature of the year at Greenwich is 2° warmer now than it was 100 years back, and that the mean heat in January in the same period has increased 3°.

The onward rapid progress of agriculture in this country need not be clogged by any fancied deterioration of the climate, or landowners from such a cause fear a depreciation of their property. There is in all the main elements which constitute our weather a fixity of action which for all practical purposes may be considered absolute; but every acre of wet land drained, or of waste land reclaimed and cultivated, adds its modicum of increased heat to the summer temperature.

III.—*Town Milk.* By John Chalmers Morton.

The following report on this subject is based upon a paper on the London Milk Trade, which was read two years ago before the Society of Arts, and was reported in their Journal of December 15, 1865. Since the preparation of that paper, and the examination then made of cowhouses in various parts of London, I have had charge of a suburban farm where a large number of cows—at one time more than 250—were kept exclusively for the London milk supply. This, with a renewed examination of a few additional town and suburban dairies, enables me to speak with some confidence on a subject which

is of considerable agricultural and of very great social consequence.

The latter consideration is not sufficiently regarded, for the importance of it can hardly be overrated. "The returns of the Registrar-General exhibit a fearful tale of infant mortality; and a large proportion of the various causes of death assigned in them may be summed up," says Dr. Druitt, Medical Officer of Health to St. George's, Hanover-square, "as simply meaning starvation." The milk supplied in shops has, in fact, been to a large extent deprived of its nutritive elements; and, "little more than the thick curd remaining, the delicate stomach of a child cannot digest it; and hence diarrhœa, atrophy, and the multitudinous diseases which tell so terribly on infant life in towns." And not only is there a result of this immediate kind contingent on the non-supply of unadulterated milk, but, as Mr. Chadwick has pointed out, the health and strength of the whole future life are compromised by it. "The foundation of the adult is laid in childhood and youth. Our strongest and best labourers are from milk-and-oatmeal fed, or milk-and-bread fed, or milk-and-potato-fed children. Our strongest navvies are from the hill-districts of Lancashire; our strongest labourers from Cumberland and Westmoreland, and from the hill-districts of Scotland, where milk is always a large portion of the food of the family. These, too, are the favourite recruiting grounds for guardsmen and soldiers of the greatest size and strength."

If mothers sufficiently realised the future consequences of insufficient nourishment in infancy, they would be quicker to recognise the causes of those ailments which are current during the time when this process of imperfect feeding is going on. No doubt there are, however, many examples of this quickness; and I met with one the other day in the case of a poor woman purchasing a pennyworth of milk in a shop where it has never been adulterated or diluted, for which every day she was content to walk a mile, saying that it was "four times better" than any she could get close by her house; and the life of her child depended on it. The stomach of a child is an unquestionable test of the quality of its food; and she had been rightly guided by its indications. But the verdict of the analyst may be also trusted; more confidently perhaps in the case of milk than in that of any other food. A mere aroma, which the balance of the chemist cannot weigh, may, indeed, sometimes destroy the value of milk, as of other food; but that is easily recognisable without analysis: and varieties of mere texture, which sometimes upset, as to any practical guidance they may offer, the conclusions of the analyst, after he has examined other foods, are unknown in the case of milk. Dr. Voelcker's

analyses, published in past volumes of this Journal as well as elsewhere, are thus directly serviceable; teaching us with definiteness and in detail a lesson which, however, experience has already taught many of us more generally, that milk, whether good or not, when coming out of London cow-houses, is very often impoverished and adulterated when served over London counters.

The 'British Medical Journal' of November 23rd, 1867, called attention to a more recent series of analyses by Dr. Voelcker which very strikingly illustrate this fact; and a short reference to his results will suffice to prove the first point to which I am directing attention, viz., that Town milk is very often most outrageously and mischievously robbed and maltreated before it reaches the consumer. Ten samples were submitted to examination—taken from shops in Blackfriars, the Strand, St. Giles's, and some of the western districts north and south of Hyde Park. Of these only one was just as the cow had yielded it. It contained 86·16 per cent. of water,—rather less than the ordinary natural proportion; and 12 per cent. by measure were cream. The other samples contained from 90 to 91 per cent. of water; and from 9½ to only 3 per cent. were cream. The price in every case but two was 4*d.* per quart; in those two it was 5*d.*; and there the quantity of cream was only 4 and 6 per cent. respectively! How great the temptation to dishonesty, and how great its facility, are both apparent from these analyses. A large business in "a first-class establishment" is prospering which sells as new what is "no better than skim-milk." The reports regarding the other cases are as follow:—"much coloured artificially, one-fourth of cream removed, and one-sixth of water added;"—"one-fourth of cream removed, and one-third of water added;" — "skim-milk, with one-third water!" — "one-third cream removed, and one-fifth water added." If 4*d.* per imperial quart be the price at which milk can fairly be sold retail, then in one of these instances, where it was sold at 5*d.* after one-third of the cream was removed and one-fifth water added, no less than 20*l.* per annum profit, beyond that of the fair retailer, is made for every gallon sold per diem: and if 100 gallons be sold daily, there is the enormous premium of 2000*l.* per annum realised by this dishonesty.

This then is the first point for consideration in any discussion of town milk—the great temptation which is offered in the trade to dishonesty, to which dealers very often yield with lamentable consequences to their customers, especially when the milk is bought for the nourishment of young children. But the 'Agricultural Journal' is hardly the place for a detailed examination of this part of the subject, and I will conclude by quoting the

letter of one recently in the trade who has had the best opportunity of forming an opinion. He says:—

"I suppose it is allowed on all sides that the London milk trade is not what it should be, and that very little pure milk is sold, especially to the poor. Before attempting to remedy this great evil the causes must be ascertained. With the poor, milk is a necessary more than a luxury; and, if pure, it is a most valuable article of food. As sold to the poor it yields a much greater profit than to the upper classes, as the former nearly always 'fetch' it themselves, and thereby save the milkman the expense of distribution, which at a West-end shop costs about ¾*d.* a quart for a wide-spread business, and ½*d.* for a compact one: and besides this, the rent in a poor district is so much lower. But in spite of all this the poor are the worst served, and the reason is that the trade among them has fallen into the hands of such very 'small' men, who sell so little, that the business cannot yield a maintenance without help from the 'cow with the iron tail.' These same small men cannot contract with a country farmer for his milk, and therefore are in the hands of the wholesale dealers. The wholesale dealers, again, give only so low a price to the farmer that he in his turn, to make it pay, must add a little water.

"And if you go below the labouring class to paupers: they are treated worst of all. We have tendered for five or six workhouses at a price which would have given us a profit of less than one farthing a quart, and yet we have not been accepted. Tenders of 1*s.* 4*d.* a barn gallon (8 quarts) have been accepted, or 4*d.* a barn gallon less than our milk now costs us at our shop; and we are only paying the market value of pure milk in large quantities. We have had men in attendance at the opening of the tenders, and it was evident that it was all settled beforehand who was to have the contracts, as the outsiders knew well before it was announced. The fact that a dealer offered to buy a large quantity of our 'skim,' avowedly to supply a workhouse contract for 'new,' shows what the paupers really get.

"Next, as regards the upper classes, the expense of distribution is so great that only a very small margin is left for profit on each quart; but, on the other hand, the businesses are generally large. The bar to the sale of pure milk among the better classes is the system of percentages to servants. They all expect 5 per cent. on the gross amount of their master's bills, and this is just about what would be net profit on an honestly-conducted West-end business. If this is not paid the milkman is 'worked out.' So, to avoid this unpleasant process, he commences by adding water sufficient to pay this tax, and as that seems to pay well he soon doubles the quantity. We lose two or three customers a week from the servants, but we continually get more new ones, as pure milk will draw in spite of all this.

"The different causes which I have enumerated above have gradually made the milk trade one of the most dishonest in London, and I believe few in it now ever make the effort to be honest.

"I have forgotten to mention one of the most rascally tricks of it, which deserves exposure. I mean the selling cream in quantities short of imperial measure. When we began our business we were forced to have cream-cans of correct measure made on purpose, as the tinman assured us that no dairyman in London sold cream except in measures 25 per cent. short, and consequently he had no others. We have found this to be true by measuring the cans of many other dealers. The milk, however, is sold in proper measures."

I now turn to what may be called the agricultural side of my subject.

Purchase of the Cow.

The art of producing milk with profit depends on the selection of a cow, and of food for it, on housing her comfortably, and on treating her with gentleness and regularity. On the selection of a cow of course depend both her current produce and her ultimate selling value. She should not be a very young cow, because her milk is not then at its full yield; and she should not be a very old cow because there is then great difficulty in fattening her. The general practice is to buy one, if possible, immediately after her 3rd, 4th, or 5th calf; and then to keep her on till she does not yield more than 6 quarts of milk a day. When her milk begins to shrink she will generally put on flesh on the same food that she has been all along receiving; but towards the end of the process 3 or 4 lbs. of oil-cake are given in addition to the ordinary food; and the upshot is, that if she was bought for 20*l.* she may sell for 17*l.* up to even 19*l.* after a milking which shall have lasted on an average from 8 to 10 months. During the last few years, when a good cow has been worth 20*l.* to 25*l.*, and markets for second-class beef have been very dull, there has been a loss on buying and selling of 4*l.* or 5*l.* a-head; and this is not merely a loss per annum, it is a loss upon 9 months, amounting therefore to one-third more per annum; so that it is thus often equal to a loss of 6*l.* or 7*l.* per annum on every stall in the cowhouse, which is a serious and may be a ruinous discount from the returns of the cow-keeper. It is plain then that in the case of this business, even more than in that of ordinary stock-farming, everything depends on skill and judgment in marketing.

In the better class of London cowhouses you see large framed, wide and straight backed, deep bodied short-horn cows, equal for size and mass and ability to carry meat, as well as yield milk, to any cattle in the world. They may have cost 20*l.* to 25*l.* a-piece on entering. Elsewhere you see small Irish and Dutch cattle—cows that have cost 13*l.* to 15*l.* apiece on entering the cowhouse, and will sell for 10*l.* to 12*l.* on leaving it. In both cases it has been customary for the cowkeepers to attend country fairs and markets and importers' yards, and pick up a cow here and a cow there as they could. It has also been a common thing for the London cowkeepers to purchase of the dealers, Bruce Johnson of Finchley, Judkins of Islington, C. Roach of West Hampstead, and others. At present cows are brought close up to the edge of the metropolitan district, cow-keepers hear of them,* and they are purchased

* Many cows are sold on the arrival of the trains, being purchased of the dealer in the truck, or immediately after leaving it, in the street.

out of some wayside lair and driven straight to the stall without entering the market, and after serving their time perhaps 8 or 10 months, and yielding at first it may be 16 and at length 6 quarts of milk a day, they go to the metropolitan market and are sold to the butcher in whatever condition as to fitness they may be. The dealers tell you that buyers invariably look to the prospect of a good sale when they buy, and that a cow which will "feed" as well as milk is essential to profit. The consequence is that the preparation of cows for the London market is a general practice in many dairy districts. Cows which are on the point of becoming too old for ordinary dairy usefulness are thus fed so as to be half fat at the time of calving, and Mr. Bruce Johnson's agents pick them up in this condition all over the northern and midland counties: and a finer lot of beasts is rarely to be seen than are offered weekly throughout the year at the Finchley Manor Farm. The attempt is made by liberal feeding and warm housing to retain this flesh with which they enter the cowhouse; and add to it so soon as the milk begins to shrink, so that by-and-bye the cow is sold weighing 7 or 8 cwts., fetching almost as much as was given for her. I have indeed seen before Christmas time a byre full of cows in Chelsea still giving 4 and 5 quarts of milk a-piece a-day, which must have been worth 28*l.* to 30*l.* a-piece for the beef they carried. That is one style of management. The cows sold out of the Somersetshire, Wilts, Gloucester, and Berkshire dairy districts do not come up so fat—do not fetch such large prices at the beginning—milk probably rather longer as a rule than the others, but lose more on being sold; or if they sell like the others at a loss of 2*l.* or 3*l.* a-piece, yet that being a loss upon 16*l.* or 18*l.*, instead of on 20*l.* or 22*l.*, is a larger loss per cent. The foreign and Irish cows, both of which are met with more frequently now than formerly, are bought much cheaper than the others, and are often very good milkers; and though they are sold for considerably less at the end of their milking (for little or no attempt is made to fatten them), yet the loss, greater than usual perhaps upon every 100*l.* of their purchase-money, is not, probably, so great in reference to the quantity of milk which has been produced by the animal; and this after all is the true test of economy.

Food of the Cow.

Having got your cows well purchased, the point of next importance is to feed them properly. Their invariable food in London cowsheds is grains (brewers' or distillers' grains, the spent barley or other grain after being well washed or "worked out" in the process of brewing and distilling) with mangolds and

hay in winter, and grass in summer. When first the cow is received into the shed it is important that she be gradually accustomed to her new food. She should therefore receive during the first week little but green food, grass, or clover or vetches in the summer, and mangolds and hay in winter, with bran mashes, into which grains may be gradually introduced, until, as she takes to them, she may at length be treated as the others are. What this management generally is, I take from the statements of two men, neither of them very large dairymen, but both of them successful managers. Mr. Sumpton, of Little Warner Street, Clerkenwell, who usually milks about thirty cows, describes his day's work as follows:—The cowmen enter the shed at 4 A.M., and proceed to milk. In the case of the wholesale milk trade, when the dealers who buy the milk do the milking, one good man suffices for thirty cows. The cowman then only helps if necessary at milking-time, and sees that the work is thoroughly done,* his main business being to feed and tend the cows. When not only milking, but serving the customers at shops and houses has to be done, three men are required for thirty cows. They begin milking at 4 A.M., and finish between 5 and 6. About a bushel and a half of grains is then given between each pair of cows, and they are partly cleaned out, and when the grains are done, a truss of hay ($\frac{1}{2}$ cwt.), is divided amongst twelve. In the meanwhile the men have been serving the milk; after which they have their breakfast (about 8 A.M.). After breakfast time a bushel of chopped mangolds, weighing 50 or 60 lbs., is given to each two cows, and the cows receive another truss of hay amongst twelve. The cowshed is then cleaned out, and the cows are bedded and left. At 1 P.M. milking recommences, and very much the same feeding as before is given. At 2·30 grains are given as before, followed by the same quantity of hay and then (and only then during the twenty-four hours) the cows are freely watered. They again receive a truss of hay amongst twelve, and are left for the night. The grains are either brewers' or distillers' grains: the former are as much inferior to the latter in value as they are in price—the one at present costing 3*d.* to 4*d.* a bushel, and the other 8*d.* and 9*d.* In the case of cows in heavy milk—also in the case of those rapidly losing their milk, which must be sent to market as quickly as possible—it is common to give 2 or 3 quarts of pea-meal mixed up with the grains morning and evening; each cow thus receiving that quantity daily. And when the milking is coming to an

* If he has any reason to suspect that a cow is not milked out, it is his duty to his master to "strip" her, for nothing injures a cow more than imperfect milking; and if he succeeds in getting another half pint from her his master will give him 6*d.* or 1*s.* for it, and fine the dealer that amount for his servant's default.

end, for three or four weeks before the cow is sold, she may receive 2 or 3 lbs. of oilcake in addition. A full bushel of grains, half a bushel of mangolds, one-third of a truss of hay, and 5 or 6 lbs. of pea-meal in the case of the fatting cow, are thus the daily ration in a London cowhouse.—The grains at 2*s.* a quarter, the hay at 5*l.* a ton, and the mangolds at 20*s.* a ton, cost 1*s.* 3*d.* a day, and with meal or cake the daily allowance may cost from 1*s.* 6*d.* to 1*s.* 9*d.* per cow—10*s.* to 12*s.* a week.

In summer time the food is grass with grains, and meal if necessary. Most cowkeepers, except the very smallest men, either have a small suburban farm, or buy a few acres of vetches, clover, or grass, and cart it in themselves. When it is bought daily at the cowhouse it costs from 1*s.* to 1*s.* 3*d.* a cwt. during the summer, and the cows receive about that quantity daily, given to them as fast as they can eat it, morning and evening, with their grains.

Of course the proper feeding of the cow after she has been well bought is the very essence of the business of the cow-keeper. It is a proof of good management when she is so treated that no kind of food which she receives shall pall upon her taste. The maxim is—never overdo a cow with any kind of food. Some cows are exceedingly greedy for distillers' grains, and they yield a very large quantity of milk upon them. But it is easy to "overdo" a cow with grains; and she should be always stinted of her favourite food, or she will get sick of it, as I have seen often enough in the case of this very article,—distillers' grains.

I add to this the statement of Mr. Dancock, of Brompton, another successful manager of cows. He uses steam in the preparation of his cow food, and in particular gives his meal in the form of gruel over cut hay or grains, 1 lb. of meal being added to a quart of water, with a little salt. "My plan," he says, "is to fill with cold water an 8 'gallon' churn (holding twice that number of imperial gallons) up to the figure 7. This allows room for meal and steam. I then put the steam-pipe within 6 inches of the bottom, and, supposing the pressure in the boiler to be 10 lbs., turn on full, and in five or six minutes the can is full and the gruel is done. I have sixteen cows, and my quantity is three cans, which allows one large pail full to each cow twice a day. I think this is better than giving them meal dry over grains. I milk before feeding, give 1 bushel of grains to a pair of cows twice daily with gruel over it, and when this is done give them green stuff and mangolds, a little hay if necessary, then water and rest till milking time again, when they are fed as before with grains; then I give oilcake, about 3 lbs. between two cows, then water and do up with hay." Mr. Dancock

adds, "Cleanliness is essential to health—whitewashed walls, mangers well cleaned, cows well cleaned and littered down with short straw—in fact, everything belonging to cows and a dairy must be thoroughly clean to preserve health. This combined with energy and attention will, in due time, bring profit to the owner."

It may be right to give the daily ration in the case of the smaller Irish and Dutch cows which are seen in some of the smaller town dairies. Mr. Mosey, of the Albion Dairy, Barnsbury, whose cows cost him from 10*l.* to 18*l.* apiece, milks at 4 and 5 A.M., gives so large a quantity as a bushel of grains to each cow at 6 A.M., and in winter 7 lbs. of hay at 9·30; as much water at 10 as they will drink, say 6 gallons (imperial) apiece, and 1 bushel of mangolds at 11. He milks again at 1 P.M., and the cows get another bushel of grains apiece at 2 P.M.; 7 lb. of hay at 5, and afterwards water if required. In summer they receive the same grains and hay as in winter, with grass, vetches, or green clover afterwards, both morning and afternoon.

The suburban cowkeeper, though more favourably situated than the London dairyman as regards the bulk of the food he consumes—the grass, the mangolds, and the hay—is less favourably situated as regards grains; and this disadvantage combined with the other of distance from the consumer, is such as at least to balance, often to overbalance, any advantage he possesses over the town dairyman in respect of labour, rent, and cheaper farm produce. Going further afield, as for example, to Swindon, and beyond it, or to distant stations on the South Western and North Western Railways, you find that the farmer feeds his cows for London, just as he has hitherto done for cheese or butter dairying. Bringing them to the pail at all months of the year, so as to have a regular produce to meet his contract with the London dealer, he milks his cows out at pasture during the summer, and feeds them on hay and mangolds in the winter. Receiving 6½*d.* to 8*d.* per imperial gallon for the milk delivered at the nearest station, and getting 500 to 550 gallons from his cow per annum, he receives 15*l.* to 18*l.* per annum for her produce, which is more than he can generally make of it in the form of cheese or butter, at the same time that he avoids all the cost of labour in the dairy. He runs, however, especially during hot weather, the risk of the milk souring on its journey, in which case it is thrown away on its arrival at his expense. But by cooling it before it starts, this risk is very much diminished; and this is done either by standing the full can ("churn" is the technical term for it) in running water, or by placing the milk, before filling it into these cans, in large tin vessels, surrounded by cold water, and traversed by cold water pipes. The risk is

further diminished by filling the cans so that they shall not shake, and covering them with wetted jackets, so that evaporation may help to keep the contents cool. There is, however, great difficulty in ensuring its arrival sound after a long journey in hot weather, during which it has been in a constant tremble, which is just the condition likely to promote chemical change. The evening's milking in the case of distant country farms arrives in London about midnight, ready for the London breakfast tables, and the morning's milking reaches town in time for tea.

Nearer London the management is very like that of Clerkenwell and Chelsea already described, excepting that to give time for the transmission of the milk everything begins an hour or two earlier. Mr. Collinson Hall, of Navestock, near Brentwood, describes his cow-house management as follows:—

"We begin milking at 1 o'clock in the morning; each man should have 15 cows. The milk arrives at 5 o'clock in London. The cows are again milked at 10 o'clock, and the milk is in London at 1 o'clock.

"They are fed as follows:—Each man gives about 4 lbs. of meadow hay to his 15 cows after the midnight milking, and then goes to bed. At 7 o'clock he gives them ½ bushel of grains mixed with a bushel of sweet chaff, and a handful of salt; the cows are then cleaned and fresh littered; 2 lbs. of hay apiece are given, and at 11 o'clock 1 bushel of mangolds are given; at 4 o'clock p.m., 1 bushel of grains and chaff; and at 6 about 2 lbs. or 3 lbs. of hay. The cows are not untied, that they may not mix together, and their water is carried to them. We feed often, and avoid giving large quantities at once.

"Lime on the floors, gas tar enough to be not offensive, and ten drops of arsenicum (3rd dilution) in the drinking water; great cleanliness, and all the provender good; not putting too many in one shed; good ventilation at the top; no draughts:—These are my precautions."

Nearer London still, the management is almost exactly that of the London cowhouses. Mr. Sumpton tells me that he feeds his cows at his farm in Hendon parish exactly as he does his cows in Little Warner-street, only beginning an hour earlier, so as to give time to bring the milk in. No attempt is made to cool it for transmission this short journey, but it arrives warm an hour after milking, sometimes however the worse in summer-time for even so short an interval.

Mr. Panter who manages Lord Granville's large dairy-farm at Golder's Green, upon the Finchly-road, thus described the management of his cows, in evidence before the Royal Commissioners on the Cattle Plague:—

"We give about a bushel and a quarter, or from that to a bushel and half of brewers' grains to each cow, and about 15 lbs. of hay, and about 30 lbs. of mangold wurzel, with 4 lbs. of meal (pea-meal principally), in addition to that feed in the winter. In the summer, grass is given instead of hay and mangold wurzel. This mode of feeding, though it damages the constitution of a cow, is adopted in order to force the greatest quantity of milk which the dairyman can get. The gain more than covers all the loss; at least it is supposed to do

so. In our suburban district we give them more air, and feed them more on grass in the fields. We do not feed them so heavily upon grains and artificial food as they do in London. We give them much more natural food. Some turn them out from about July to October; and some do not. The cows always lose condition by being turned out; that is invariably the case. They lose milk, too, to the extent of a quart a day, unless the pasture is very good indeed."

It is plain that the London cow management for milk production is certain to be followed wherever it can, if cows lose both flesh and milk when turned out to grass. Mr. Balls, who manages the dairy-farm at Oakington, near Sudbury, in the occupation of Colonel the Hon. W. P. Talbot, has kept from 80 to 100 cows constantly in stalls. They are milked at 3 and 4 A.M., and again at 1 and 2 P.M., and are fed exactly on the London plan, first on grains, a bushel between two, next with a little hay, then with a bushel of either cabbages or mangolds, and then again a little hay,—in the afternoon grains and hay and water (they are only watered once a day), and again hay before night. The alteration in summer is a substitution of grass for hay and mangolds. A small quantity (3 or 4 lbs. a day) of meal is given along with grains in the case of cows nearly dry; or rather this used to be given, for Mr. Balls now declares that there is no profit in the attempt to put on extra flesh with extra feeding, so long as meal is so dear and meat so cheap. He contrives, however, by careful purchasing to get cows which will put on flesh without extra feeding as they get dry.

At Lodge Farm, Barking, where several cowhouses holding 60 cows a-piece have been built at intervals of 200 or 300 yards from one another, in the midst of 50 acres of land, which is being irrigated with North London sewage, and has been thus producing enormous crops of Italian rye-grass, the rule of London management has been till lately carefully followed. A bushel of grains between two cows has been given immediately after milking, and followed by a little hay (a truss amongst 10 or 12 cows). They were then watered freely, and afterwards 30 or 40 lbs. of pulped mangolds mixed with hay chaff were given, and the cows were left. The treatment in the evening was exactly the same, except that a little hay was given when they were bedded-up for the night. In this case distillers' grains were used; and whenever the supply failed us the milk ran short at once. The yield dropped one-fifth, sometimes one-fourth, at the very next milking after the missing meal of grains, and brewer's grains were a very inefficient substitute for them. The quantity of milk would however gradually increase again under other feeding, as soon as the cows had taken cordially to the new ration whatever it was, but in no case did it ever amount to the quantity which was quoted when they received their fill of distillers' grains. Latterly, partly owing to the cost and difficulty of

obtaining these grains, and partly because it was desirable to test the value as cow food of sewage-grown Italian rye-grass given by itself, the mode of feeding has been altered. Several cowhouses were supplied with grass alone during the past summer, receiving nothing else whatever, and about 1½ cwt. a day was the average consumption per cow; and though the substitution of a bushel of grains for ½ cwt. of grass was at once followed by an increased yield of milk, yet the latter was so much the dearer food that the balance of profit was against it as long as grass was not valued at more than 18*s.* a ton upon the land. In winter we are giving mangolds, hay, and meal, without grains. In one shed at present 25 cows nearly dry are receiving 16 cwts. of mangolds, 7 trusses of hay, 100 lbs. of barley meal, and 80 lbs. of cake; which is 70 lbs. of mangolds, 8 lbs. of hay (these are given as chaff and pulp), 4 lbs. of barley meal, and about 3 lbs. of cake per fatting cow. In another shed where 58 are being fed, 17 of which are freshly calved cows, and the rest are in about half milk, the consumption is 2 tons of mangolds, 12 trusses of hay, 7 trusses of straw (all chaffed and pulped and mixed) 56 lbs. of meal, and 36 lbs. of cake. This amounts to about 80 lbs. of mangolds, and 16 lbs. of mixed hay and straw (with 3 or 4 lb. of meal and cake to a few of those most nearly dry or in heaviest milk). The 17 cows in full milk get 13 lbs. of hay, 76 lbs. of mangolds, 2 lbs. of meal, and 2 lbs. of cake a-piece, costing at current prices rather under 2*s.* a-piece. They gave at first on the average 2 barn gallons (= 16 quarts) a-piece, which are worth delivered in London 3*s.* 4*d.*

I add here, from the paper on this subject read before the Society of Arts, a table giving the daily winter rations of a cow in 13 cowhouses, of which the owners were good enough to describe to me the management:—

No.	Cows Milked.	Daily Winter ration of a Cow.				
		Grains.	Hay.	Distillery Wash.	Mangolds.	Meal or Cake.
	No.	bushels.	lbs.	gallons.	lbs.	lbs.
1	108	1½	15	..	30	3 (F)
2	40	1	14	..	40	2 (F)
3	68	1	?	..	42	?
4	10	1½	12	..	60	2 (F)
5	100	¾	9	..	56	3
6	20	1	6	..	56	3
7	?	1	14	..	28	Pint of condiment.
8	50	1	12	..	28	Peck of bran.
9	?	1½	9	..	28	Pint of meal.
10	?	1½	15	..	30	?
11	50	1	14	..	25	5
12	?	1½	7	..	60	4
13	?	1½	11	6	42	3

The letter F intimates that the meal or cake was given only to fatting cows. It will be seen that in only one house was distillery wash given; and I believe that though productive of a great quantity of poor milk, it is not by any means a common article of food in London dairies. Its reputation as a washy food may, however, have hindered my being told of its use. There is nothing, I believe, that more excites the milk secretion, and when given fresh along with other substantial food, no objection can be made to its use.*

In only one other particular does town dairying differ from that of country farms. No attempt is made to breed from the cow. It is very rarely indeed that a bull is kept, or that the cow receives one in a London cowhouse. She is kept till the quantity of her milk no longer pays, and she is then sold. In the country, on the other hand, it is of course generally the policy of the farmer to keep on his better cows for several seasons, and to breed from them. But the management in that case in no respect differs from that of ordinary dairy-farms, which is not my subject; and even as regards suburban dairies this perhaps more properly comes under the third section of my subject—the general treatment of the cow.

Treatment of the Cow.

In so far as the feeding of the cow belongs to this part of the general subject of town dairies—and of course it is the most important part of it—the only remark that need be made after what has been already said is that the food must be always good of its kind, and regularly and punctually given. Faulty food soon shows itself in the quality of the milk; and irregularity in feeding or any other disturbance of so sensitive a creature as a milch-cow is sure to be followed by a diminished yield of milk. Swedes and common turnips taint the milk; and if given at all should be used either in small quantity with other food, or, what is better, cooked in a hot mash.† I have given cabbages for months together to upwards of 100 cows without any particular care being taken to keep spoiled or rotten leaves out of the manger, but I have never found the milk tainted by them. To steam food which has any aroma belonging to it communicable to the milk is of course, as already said, the best way to make it

* It is, however, objected to the use of distillery wash, and in a less degree to that of grains, that the milk derived from their use as a food needs to be consumed at once, as it will "turn" more rapidly than the milk of grass-fed cows. I know of no direct experiment on this point, and can only refer to the impression which some milk dealers have that this is so.

† Here, too, attempts are made, by using saltpetre in the water with which the cans are washed, and by putting a little in with the milk itself when they are filled, to get rid of any taint which it may possess.

harmless. But though I have been over 60 London and suburban cowhouses, I know of none where cow food is steamed or cooked, excepting only Mr. Dancock's shed at Brompton, and there the steaming goes merely to the manufacture of a gruel to be thrown over an uncooked food, as hay, chaff, or grains. It is nevertheless certain that steaming food, wherever labour is not very costly, or where the existing hands have time to spare for the purpose without interfering with their efficiency elsewhere, improves its nutritiveness, and may be confidently recommended.

A correspondent of the 'Agricultural Gazette' some years ago thus described his management of cows in winter time. He said:—

"I have a boiler containing about 40 gallons, and into it I put about 50 lbs. of turnips, a considerable quantity of water, and about 12 lbs. of straw cut into chaff, and this is boiled for about two hours, when it becomes a dark nasty-looking mess; one-half of this is taken out into two tubs, and whilst warm 1½ lb. of bean or pea-meal is stirred into each, and then given to each cow at about 110° of heat. That which is left in the boiler remains till morning, and if well covered up is still warm enough for use; it is then mixed with the pea or bean-meal, as before, and given to the cows at break of day; this, with hay *quantum suff.*, constitutes their daily diet; and I get about 6¼ lbs. of butter weekly from each cow. The butter produced in this way has no taste of turnips; and the avidity with which the cows eat this boiled mess is a good criterion of its value. When given to the cows it should be thin and sloppy."

Mr. Horsfall's management as regards steamed food for cows, already described in this Journal, is no doubt fresh in the memory of its readers.

He gave his dairy cows rape-cake, of the kind termed 'green' cake, which imparted to the butter a finer flavour than any other kind of cake; and in order to induce them to eat it, he blended it with one quarter the quantity of malt-dust, one quarter bran, and twice the quantity of a mixture in equal proportions of bean-straw, oat-straw, and oat-shells; all well mixed up together, moistened, and steamed for one hour. This steamed food had a very fragrant odour, and was much relished by the cattle: it was given warm three times a day, at the rate of about 7 lbs. to each cow (or 21 lbs. daily). Bean-meal was also scattered dry over the steamed food, cows in full milk getting 2 lbs. per day, the others but little. He found this substance to be an unfailing means of keeping up the condition of cows while giving milk. When the animal had eaten up this steamed food and bean-meal, they were each supplied daily with 28 to 35 lbs. of cabbage from October to December, of kohl-rabi till February, or of mangolds till grass time; each cow having given to her, after each of the three feedings, 4 lbs. of meadow hay (or 12 lbs. daily). The roots were not cut, but given whole. The animals were twice a day allowed to drink as much water as they desired. After the date of his original report, Mr. Horsfall discontinued the use of bean-meal owing to its comparative price, and gave in its place, along with about 5 lbs. of rape-cake, an additional allowance of malt combes, and 2 or 3 lbs. of Indian corn-meal per cow. On this food, in instances actually observed, his cows gave 14 quarts of milk a day, at the same time that they gained flesh at the rate of about ¼ cwt. per month.

These instances, however, of the use of steamed food in country experience are perhaps the less likely to induce any alteration in town cowhouses, from the fact that there a large portion of the dairy food, viz., brewers' and distillers' grains, has already gone through a cooking process.

But the thing of all others, so far as my experience has gone, which is most important in order to the sweetness of the milk is, that the water given to the cows be clean and good. In one of the Lodge Farm cowhouses the tank sunk for the reception of grains, large enough to hold two or three days' supply when firmly trodden into it, had not been built water-tight, and the leakage of stale grains escaped and tainted the well, at some little distance (in a gravel subsoil), from which the cows were watered; and the milk of several milkings was utterly spoiled before the cause of the mischief was discovered. It arrived in town during two or three days stinking of foul grains; and there is not a more offensive smell. The foul water given to the cows was I believe the sole cause of the misfortune, for it ceased soon after pure water was supplied. Good food and water, regularly given, are thus essential parts of successful cow-keeping. It should be added here that the proportion of soft and succulent dry food should be regulated with regard to the condition of the dung. If a cow becomes at all costive she loses milk at once. The dung ought to be rather loose than otherwise, in order to keep her in good productive condition. I need hardly say that quiet and gentle treatment of the cow is also an important point; and an ample interval of absolute rest between feeding and milking, during which the less she is disturbed the better, contributes materially to her productiveness at the pail.

One of the things which most strikes a stranger who first enters a London cowhouse during winter is the warmth in which the cows are kept. Experience has proved that this, too, has an important influence on their productiveness. They stand very thickly on the ground—one to every 30 to 36 square feet; the windows are closed and matted, and no thorough draught allowed; and thus the shed is warmed. There is generally room enough overhead, and perhaps a tiled roof, which allows ample ventilation; and thus, where the shed is kept tolerably clean, the air is sweet enough, as well as warm.

Very little litter or other bedding is used. I have been over large suburban cowsheds where none whatever is used. The cows stand so close to each other that they cannot get across, and thus the dung and urine fall from them into the gutter behind them, from which it is cleared twice or thrice a day, and the lair—an earthen floor—is thus kept dry. At the Lodge Farm we have used sawdust. At present 8 cwt. is the daily

allowance in two sheds containing 85 cows, and there were exactly 21 tons of dung removed from these two sheds last week, being 3 tons daily. Most of the urine runs into a tank, only a portion of it being retained in the litter that is used. Two or three bushels of sawdust are, in the first place, put under every cow, and thereafter one bushel daily is sufficient, as much being daily taken as fast as it gets soiled. The quantities amount to about 11 lbs. per cow added, and 80 lbs. of dung per cow taken; so that we collect about 70 lbs. per diem of the actual fæces of the animal. I may on this refer to a letter received twelve years ago from Mr. Telfer, of the Canning Park Farm, near Ayr, who kept 48 of the small Ayrshire cows for a butter-dairy. He found that these cows yielded 60 lbs. of dung and 18 lbs. of urine every twenty-four hours. Taking their smaller size into account, this agrees very fairly with our experience at Lodge Farm. He adds that the cows yielding most milk, at the same time yielded the most dung and urine; which is not surprising, seeing that these are, in fact, the *débris* of a manufacture, and must be greater or less according to the quantity of raw material which passes through the machine. Mr. Telfer's cows lay on a cocoa-nut matting, their dung and urine falling into an accurately-made gutter, which was cleaned out perfectly by a single draw of a drag made to fit the groove. In London cow-houses the rough causewayed floors are cleaned out with besom and spade into a dung-pit, which the sanitary inspector requires to be emptied at intervals; and the gutters in well-managed houses are washed down frôm the pail.

The Cowhouse.

The mode in which the cattle are housed is an important part of their treatment.

As regards the existing cowhouses I cannot do better than quote, in an abridged form, the description given of them in the Paper read before the Society of Arts:—

"A London cowhouse may be, and often is, a piece of ill-conditioned, rather ricketty old stabling, with a sort of brick-built manger on the floor, the length divided by short and scanty stall divisions, 7 feet or 7½ feet apart, furnished with ropes or straps or chains, with running rings, so as to tie up two cows between each pair. This floor is roughly causewayed, and there is a gutter lengthwise down it, parallel with the manger, and a little more than a cow's length from it. The house may be only wide enough for a single row of cows, or there may be one on either side, with the gutter between them for the drainage of both. I am now referring to the average style of the smaller and inferior cowhouses in the city, and in the poorer districts of the metropolis. The roof is either low, with plenty of ventilation through its loosely-lying tiles, or if higher, there is a 'tallet' or floor overhead, where hay and other food are placed, and in which wide spaces are left next the walls and over the heads of the cattle, and then the space of this upper room is measured

into the 1000 cubic feet per cow, which is the rule that must be observed (for instance, in St. Pancras) if the cowkeeper wishes to avoid being opposed for a renewal of his licence. There are window places, which at winter time are closed, perhaps with a bit of sacking nailed over them.

"It is either a clean and tidy place, where both the cowmen and their stock are clean and dry and comfortable, everything in its place, the animals all lying down, having comfortably fed, and the air with no other perceptible smell than that of the chloride which the careful owner sprinkles once or twice a day along the gutter—*or*, it is a filthy hole. In general the accommodation —limited as it is—is quite apart from the dwelling-house, but there are exceptions even to this.—Such is the smaller but most numerous sort of London cowhouse.

"Go a step higher, and you come upon a class of men many of them also occupying small farms near town, all of them employing very considerable capital. They keep 30, 50, 80, or more cows apiece, and these are lodged either in larger establishments of the kind already described—not unfrequently ram-shackle old buildings with yards attached, either with double-roofed cowhouses, or covering a square, sometimes with a floor overhead, and at others open to the roof, where the cows are arranged, first around the walls, and then in a square block head to head in the middle. Sometimes there are parallel rows of roofing together, and double rows of stalls under each. And here, too, there is the same variety of management as to cleanliness and order. I could point out some samples even of this higher class, which are unquestionable nuisances, and others as clean and sweet as a parlour; for in this middle class of cowhouses, as they may be called, there are examples of the very best style of cow accommodation.

"Take for example Mr. Dancock's dairy already named: you enter through a wide gateway a passage roofed with glass, covered with vine-leaf and sometimes grapes, leading you to a well-kept yard, with clean and comfortable cowshed on one side, and stabling, hay-house, and food-store on the other, and an inner cowhouse further on. Elsewhere, still in Chelsea, you may enter a larger yard in a poorer neighbourhood, and find shedding closed against the winter, providing as good accommodation, in single rows, for as good a herd of dairy cows as I ever saw—cleanliness and order being apparent everywhere. Or you may pass from a well-kept mews into a lofty, clean, and, though ceiled, well-ventilated and well-drained apartment, at least 12 feet high, with, I should suppose, 60 square feet of standing ground to every beast—warm, well-watered, and well-fed.

"In Marylebone (at Mr. Drewell's, Upper Weymouth-street) you find in a good street, a corner shop, where the side road leads to a well-kept first-class mews. The master takes you through his three-storied cowhouse, as you may call it—and first into an apartment for 12 or 16 cows, which is the quarantine station through which, after some weeks' trial, they pass into the other rooms, one directly overhead reached by a sloping gangway, and the other along-side but lower down. The floors are all closely bricked in cement, the upper one being laid on brick arches, and the drainage is everywhere perfect. Nowhere are there better, cleaner, neater, and sweeter cowhouses than, taking these examples as an illustration, may be kept and are to be found in London streets.

"Lastly, I come to the larger establishments, where 200 cows and upwards may be milked. And here, too, you find two classes of establishments—houses, on the one hand, where you can touch the ceiling, dark and dirty, and crowded with unfortunate beasts; or where, in spite of ample space and lofty roof, the poor cows are comfortless and filthy—and places, on the other hand, where the accommodation is first-rate, roomy, clean, and comfortable—a single cattle shed, it may be, like Mr. Camp's, in St. Pancras, in the midst of

a large and roomy yard, 90 yards long and 26 feet wide, with a broad gangway between two rows of cattle—or several sheds, clean, dry and warm, each well managed, placed at intervals in a clean and spacious yard, such as Mr. Veale's first-rate establishment, in the Acacia-road, St. John's-wood.

"Such then are the London cowhouses, of many sizes, and of at least two styles of management, in one of which a daily cleansing of the whole establishment, dung-pits included, insures perfect order and condition; and in the other, muddle and dirt easily create a nuisance."

To this I add a short description of the cowhouses erected on the Barking farm to which I have referred, which are complete and satisfactorily-equipped cow-sheds. They were designed by Mr. James Avis, one of the clerks of works employed by the Metropolis Sewage Company. Intended to hold 60 cows, with room for fodder, shed for grass and roots, pit for grains, well, tank for urine, safety for tools, and sleeping apartment for men, they are boarded buildings 120 feet long, and 26 feet wide, 10 feet high to the eaves, with boarded and felt-covered roof. The beams, morticed into uprights at 2 feet below the eaves, are 7 feet 9 inches from the ground, and carry a floor along the middle about two-thirds of their length in width, and extending the whole length of the building, except in the central shedding for grass, which is open to the roof. The cows stand back to back, the mangers lying along the sides of the building, and a central gangway, 5½ feet wide, lying between the two rows. The space is thus open to the roof above the heads of the cows, and there is ample ventilation, by means of flaps under the eaves, louvre ventilators in the ridge, and open doors at either end. The sleeping-room for the men—a space about 15 feet square—is boarded off from the upper flooring, which is used for storage of hay and straw.

Near the middle of the house—14 pairs of cows being on one side, and 16 couples on the other—boarded up so as to make two separate cowhouses on each side of it—is the shed for grass and roots, 15 feet wide. Underneath one corner of it is the well and pump, and in the other the grain-pit. Here, too, is a lock-up for the tools employed. Into this shed the carts are backed and tilted, and the food—grass, or roots—lies stored here, midway of the cattle which are to consume it, so as to economise the labour of distributing it. The whole surface covered by the roof is laid out for the most part with a common brick floor on concrete. A tiled drain runs down the middle, 2 feet deep, to take the urine to the tank at one end of the building. The mangers along each side of the building are about a foot off the ground, brick-built and cemented, so as to be fit for holding water as well as food. They are about 2 feet wide and 6 inches deep. A pump, drawing from the well, is furnished with a moveable spout, so that each of the four sections into which the

mangers throughout the building are divided may be supplied with water in succession. The cows stand two and two in seven-feet stalls with short wooden divisions. The lair next the manger is rammed earth, the latter half of its length is a brick floor. It is 6 feet 3 inches long (from the manger to the gutter), and there is a drop of 4 inches into the gutter, which empties at intervals into the central drain. The gangway behind the cows and between the two gutters is 5½ feet wide; and in this central gangway a wooden tramway is sunk flush with the brick-floor, on which a truck runs from one end of the shed to the other, and is used to collect the dung when the shed is being cleaned, and to carry it to the manure stance at the further end near the tank. The cows are secured by neck-chains and sliding rings to long upright iron staples in the posts, each on its own side of the double stall. The whole thing is compendious, not very expensive (costing about 4*l.* per cow), and economical of the labour performed in it; and this is a very important consideration.

Health of the Cow.

The treatment of the cow has thus been discussed under the several heads of food and water, regular and gentle attendance, and accommodation, including reference to its lair and to the ventilation and warmth of the air it breathes. And on these particulars, if the cow be free from illness when she is bought, her health depends. But she may be purchased with the seeds of disease already implanted, and she may thus bring disease to others as well as suffer it herself. Generally the first symptom of any impending attack is a diminution in the milk. Mr. Mosey, of the Albion Dairy, Barnsbury, tells me that he has long been in the habit of daily recording the milk of every cow, just for the sake of having this indication brought immediately under his attention. And the cowman who is constantly in attendance on a dozen cows, of course at once detects a failing of this kind, whether he records it or not. The loss of milk sometimes appears even before a loss of appetite. In such a case, when the cattle plague has been about, the rule has always been immediately to send the cow to market: and even now, if the cow is half fat, it is the best policy whenever, if guided by these symptoms, the owner believes a serious attack of any kind to be impending, to sell the cow at once. For the avoidance of disease, and even it is believed for the cure of it, when only the germ exists, it is a good plan in the case of all newly bought cattle to give a drench of one ounce of nitre in a quart bottle of water, into which 4 ozs. of flour of sulphur have been well shaken. I have known dealers of large experience thus drench all

their cattle immediately after leaving the fair where they have been bought; and there are stock-owners who invariably give this drench at spring and fall of the year, when a change of food is general; and in both cases it is said that great advantage is derived in the consequent freedom from diseases such as foot-and-mouth disease, which are picked up in markets, or happen at the change of the season. And the practice may therefore be recommended to any one who is buying country cows for a London cowhouse. Of course when your stock is attacked by any malignant disease like cattle plague, there is no help for you in any such expedient as this. I have gone through an experience of this kind, 127 cattle out of a herd of 238 having been slaughtered on the Barking farm in August last year, owing to an attack of cattle plague. Here the only safeguard for any neighbouring cows is entire seclusion. Refusal of admission to strangers when any infectious disease is near is the only hope of avoiding it. Daily sprinkling with chloride of lime along the gangways after they have been cleansed; hot lime thickly spread in all entrance ways through which those going to and fro must tread, and above all, a strict quarantine—must be insisted on. Two of the cowhouses on the Barking farm containing 111 cows were thus saved while the cattle plague was raging in the homestead and in other sheds along the thoroughfare only 300 yards away; and I have no doubt that the safety of these was owing to the entire isolation in which for a month they were kept. The attendants on these cows, whether men or horses, were refused access to any other part of the farm for that time, and the cowmen were strict prisoners for a month.

Before referring to the produce of the cowhouse, and to the quality and quantity of the milk obtained in it, it is proper very shortly to insist on the essential need of cleanliness. This though especially required in the dairy is desirable everywhere. The cow, like all other animals, is the happier and more healthy for it. The dairy vessels must of course be clean, the pails must be scoured and rinsed after every milking. The milk is poured from them through a strainer at once into the can or "churn," which stands ready to receive it at the cow-house door; and in a suburban farm it is at once lifted into the spring-van which takes it directly up to town. Or in the case of a farm farther afield, the churn is placed to stand in water and its contents are cooled down before being sent away. These "churns" must be scalded and rinsed after being emptied at the dealer's; and when returned to the farm they must be again scoured, and scalded, and rinsed, before being used. There is a boiler in the washing-house on the Lodge Farm, Barking, with a steam-pipe from it lying along

the floor; and steam-jets rise from it. After they are scoured the churns are put upside down over these, and receive a very thorough final cleansing by a jet of steam playing thus for four or five minutes within them. They then stand on an open floor in an open shed to drain and cool, and are fit for use. Cleanliness and coolness are essential things. Having these, and providing as rapid a transmission as possible, the consumer, will receive the milk, such as it may be, at its very best.

The Milk Produce.

What this milk is, however, depends upon the cow and the treatment of her, to which we have been referring. The milk of every cow has its own natural standard of quality, but taking the case of each apart, her milk is rich or poor, *first*, according to her nearness to the time she calved; and *secondly*, according to the quality of her food. The milk of a big ordinary cow, bought half fat for a London cow-house, will throw up 14 to 16 per cent. of cream in three hours in the lactometer during the first few weeks after calving; and the same cow similarly fed will not yield much more than half so good a quality, when after six or eight months milking she is rapidly diminishing her quantity. At an equal age however at the pail, the London cow, fed so as if possible to maintain or increase her flesh, will yield a richer milk than a country-fed cow which is being milked at grass. The way to keep a uniform quality when, as in London, a great part of of the food (grains and hay) is constant throughout the year, is to keep buying in fresh cows in pretty constant numbers, throughout the year. But except in the poorer districts, where the demand for milk does not vary throughout the year, this is not commonly done. A London cowshed in the west-end for example, is full only during the spring and summer months when London is full. And as it is then that a richer milk is wanted for the sake of the cream which is required at "good houses" during the season, that is the proper time to buy in freshly calved cows. And, as the quotation given at the outset of this essay proves, dealers do not scruple to take a portion of the cream it throws up, and even to add water before selling the thus manufactured article as new milk.

As regards the average quantity of milk yielded by a cow under the circumstances of a London cowhouse, I have been told that this very dishonesty is sometimes a difficulty in the way of obtaining trustworthy information. The small cowman who, by adding water, sells more than his cows produce, will, it is said, report a yield larger than the truth to cover his roguery.

At many small cowhouses which I visited two years ago I was

told that 11 and even 12 quarts a day are obtained on an average throughout the year; that is to say a house of 10 stalls always full will yield $10 \times 365 \times 11$ quarts of milk per annum, which is equal to 40,150 quarts or 1000 gallons per stall. If, as is probable, these cows are changed every 8 months on an average, then 10,000 gallons is the quantity yielded by 15 cows during the 8 months after calving before they are sold. Each cow therefore yields 666 gallons in its 8 months milking. This, though a large quantity, is not incredible. In the case of the Frocester Court Dairy (Gloucestershire), of which a full account has been given in the 'Bath and West of England Journal,' Mr. Harrison (now one of H.M. Rivers Pollution Commissioners) found that of his 104 cows, 8 in the first year of milking (calving at 2¼ years old), yielded 317 gallons per annum; 15 also in their 1st year (but brought to the pail at 3 years), yielded 472 gallons; 14 in their 2nd year averaged 535 gallons; 15 in their 3rd year averaged 616 gallons; 20 in their 4th year made 665 gallons a-piece; 18 in their 5th year yielded 635 gallons; 9 in their 6th year made 708; 15 aged cows averaged 651 gallons a-piece. These figures, however, give only an approximation to the truth if they be taken to indicate the average yield of milk of a cow at different ages; for doubtless in a large herd like that of Frocester Court, the bad milkers, which would keep down the average of the 1st or 2nd year, would be culled out, so that only the better cows would remain. It is cows in their 3rd, 4th, 5th, and 6th year of milking which are found in London dairies; and such cows at Frocester, depastured in the summer, yielded from 650 to 700 gallons of milk a-piece per annum. They were however milked 10 months, whereas the London cow is got rid of after 8 months milking in the case I have supposed. But the quantity of 11 and 12 quarts a day, which is the extreme report of some of the smaller cowkeepers, does not seem on a comparison with Frocester so incredible. On the other hand if you consult the larger cowkeepers, supplying dealers who come and milk the cows paying for what they take away, they will tell you that the average yield does not exceed 9 or 9½ quarts a day to every stall. It is plain that where cows are kept on till their daily yield is 5 quarts or less, in order to get fattened before sale, the average must be less than where the cow is got rid of sooner, and a greater loss submitted to upon her sale. On Lord Granville's farm at Golder's Green, Mr. Panter, his lordship's agent, has told me that 3900*l.* was received one year for the milk of 100 stalls; in another year the sum received was 4300*l.* from 108 stalls constantly occupied; and in a third 4900*l.* was received from 120 stalls. This at 1*s.* 10*d.*

per 8 quarts, which was the price received, amounts to 851, 868, and 891 imperial gallons per stall per annum, or 9⅓, 9½, and 9¾ quarts respectively per cow per diem. This is where about 150 cows were purchased and sold every year at a loss varying from 3*l.* to 4*l.* a head to keep 100 stalls constantly full. The cows were thus kept upon an average 8 months each, and two-thirds only of the above quantities, 568, 587, and 594 gallons are all that was taken from each cow during the 8 months it was kept.

I was informed that 89,236 imperial gallons were obtained in one year upon Colonel Talbot's farm at Sudbury from 80 stalls. The cows were sold earlier than at Golder's Green, not being kept longer on the average than six months (153 having been sold and bought to keep 80 stalls full). In this case no less than 1115 gallons was obtained per stall per annum, or fully 12 quarts per stall per diem. The cow here yielded 560 gallons in little more than 6 months; which is an enormous quantity for the average of so large a number as 80.

I have yet two other cases by which to illustrate this point—the small dairy in Islington and the farm at Barking, to both of which I have already referred. In the former there are (Jan. '68) 17 cows in milk, and they are giving rather over 140 quarts a day, or about 8¼ quarts a-piece; but many of them are old cows, and some, an unusual thing, are in calf and nearly dry. The owner tells me that the quantity calculated on in a shed of 20 Irish cows is an average of 10 quarts a day a-piece. He seldom keeps a cow after she gets down to 6 quarts; and, as he considers it does not pay to fatten cows in London, he sells at an average loss of 4*l.* or 5*l.* a head. Buying them at from 12*l.* to 18*l.* a-piece, or at an average of 15*l.*, he has generally sold them at an average of 11*l.* He has given me the following account of six cows during the past year, which, however, represents more than his ordinary experience.

No.	When Calved or Bought.	Cost apiece.	Daily Produce in Quarts.		
			Till June.	June till September.	September till December.
	1867.	£.			
1	February 5	18	16	14	12
2	,, 7		13	11	8
3	July 12	15	..	12	11
4	,,		..	12	10
5	August 3	15	..	14	13
6	,,		..	12	10

Of a small shabby-looking little cow I saw there the other day the following history was given me:—She was in heavy milk when attacked by the cattle plague in the summer of 1866, which of course entirely stopped her milk. She recovered, however, and her average produce amounted to twenty quarts a day for nearly three months after her recovery. It averaged seventeen quarts a day during the next six months; and twelve quarts a da for another six months; and it is now shrinking rapidly, as she is in calf; but she is still giving seven quarts a day. We occasionally meet with extraordinary examples of this kind, where cows remain for years together in milk without breeding; but, like all other agricultural maxima, they have little or no influence on the general average of experience.

I have now to relate the experience of a year at Lodge Farm, Barking, notwithstanding that, owing to the disaster in August, when more than half the cattle were slaughtered by orders of the Cattle Plague Inspector, the returns do not so accurately represent ordinary experience as would otherwise have been the case. I give in the following table the number of cows milked each week up to the end of 1867, the quantity of milk sold each week, and the daily average per cow during each week. It will be seen that 126 cattle were killed in the middle of August. We have not ventured to purchase again till lately. Twenty newly calved cows were bought two months ago, and are now averaging rather more than three gallons a day apiece. But there are a large number of cows giving hardly more than six or seven quarts a day upon an average, which have been long at the pail, and which there is no profit in fattening. Most of them accordingly have been got in calf, and are drying rapidly. This, of course, is much against the average of the year. On the other hand, a large number of cows were killed off in full milk. So that while there are a hundred cows or more which have been ten or eleven months at the pail, and which pull down the annual average, there are more than a hundred on the list of the year which were only two or three months in milk when slaughtered; and, they, on the other hand, contributing more than the ordinary daily quantity, increase the average. It will be found on an examination of the following table that about 139,746½ gallons have been given in 65 weeks by 57,334 days' milk of a cow. This is equal to rather more than 9⅔ quarts a day per cow; which very closely resembles Mr. Panter's experience at Golder's Green. See opposite page.

The true significance of these figures will perhaps better appear if the amounts which they indicate for twelve months be taken out. In the table at p. 94 accordingly I have given the quantity

Week ending.	Number of Cows at end of Week.	Number of Days Milking of a Cow during Week.	Total Produce of Milk during Week.	Gallons per Cow Daily during Week.	Week ending 1867.	Number of Cows at end of Week.	Number of Days Milking of a Cow during Week.	Total Produce of Milk during Week.	Gallons per Cow Daily during Week.
1866.	Cows.	Days.	Gallons.	Gallons.		Cows.	Days.	Gallons.	Gallons.
Oct. 5	8	56	161	2·88	May 24	247	1,720	4,589	2·66
,, 12	8	56	188	3·36	,, 31	252	1,764	4,830	2·72
,, 19	14	93	310	3·32	June 7	252	1,764	4,827	2·72
,, 26	23	148	435	3·06	,, 14	253	1,765	4,750	2·68
Nov. 2	23	161	545½	3·38	,, 21	255	1,775	4,688	2·63
,, 9	23	161	549	3·4	,, 28	255	1,785	4,501	2·54
,, 16	23	161	540	3·34	July 5	255	1,785	4,262	2·39
,, 23	28	191	596	3·12	,, 12	255	1,785	4,054	2·27
,, 30	35	231	695	3·0	,, 19	247	1,729	3,910	2·26
Dec. 7	35	245	777	3·08	,, 26	247	1,729	3,832	2·21
,, 14	44	276	824	3·0	Aug. 2	237	1,659	3,739	2·25
,, 21	46	312	958	3·06	,, 9	237	1,659	3,658	2·20
,, 28	53	346	1,095	3·14	,, 16	116	1,239	2,488	1·76
1867.					,, 23	111	777	1,458	1·89
Jan. 4	57	384	1,170	3·04	,, 30	111	777	1,431	1·85
,, 11	61	411	1,234	3·0	Sept. 6	111	777	1,405	1·82
,, 18	70	458	1,365	3·0	,, 13	111	777	1,403	1·82
,, 25	72	496	1,475	2·7	,, 20	111	777	1,418	1·82
Feb. 1	77	524	1,575	3·0	,, 27	111	777	1,443	1·88
,, 8	87	594	1,736	2·92	Oct. 4	111	777	1,414	1·82
,, 15	87	609	1,831	3·0	,, 11	111	777	1,339	1·73
,, 22	94	651	1,929	2·96	,, 18	111	777	1,359	1·74
Mar. 1	95	695	1,961	2·8	,, 25	100	739	1,338	1·82
,, 8	132	793	2,167	2·6	Nov. 1	100	700	1,266	1·8
,, 15	169	1,040	3,067	2·94	,, 8	92	644	1,190	1·82
,, 22	186	1,238	3,631	2·92	,, 15	92	644	1,121	1·74
,, 29	192	1,357	3,970	2·92	,, 22	92	644	1,060	1·64
April 5	204	1,420	3,876	2·72	,, 29	92	644	983	1·52
,, 12	207	1,434	3,698	2·40	Dec. 6	90	630	987	1·56
,, 19	202	1,437	3,675	2·56	,, 13	79	578	1,087	2·09
,, 26	203	1,421	3,702	2·6	,, 20	78	546	1,099	2·19
May 3	203	1,421	3,615	2·54	,, 27	73	511	1,076	2·1
,, 10	224	1,515	4,040	2·60					
,, 17	224	1,568	4,351	2·77	Total ..		57,334	139,746½	2.44

of milk produced in twelve months, dividing it by the number of days of a cow milked during those twelve months; and so representing the average daily produce of the cow during the whole year.

I fear that these figures (let alone the fact which we may infer from them, that disastrous losses, if not from cattle plague, from pleuro-pneumonia and from foot-and-mouth disease, are possible) are not particularly encouraging. We have been receiving 1*s.* 5*d.* to 1*s.* 8*d.* the barn-gallon—*i. e.*, from 2⅛*d.* to 2½*d.* per quart—for this milk upon the farm. We have been paying more

Year ending	Quantity of Milk produced.	Number of Days of one Cow.	Daily Milk per Cow.
	Imp. Gallons.		Imp. Gallons.
Sept. 27, 1867 ..	124,427½	48,723	2·55
Oct. 25 ,, ..	128,783½	51,440	2·5
Nov. 29 ,, ..	131,478	53,811	2·44+
Dec. 27 ,, ..	132,073	54,897	2·41−
67 weeks ..	139,746½	57,334	2·44−

than 1*s.* a week per cow for cowmen; the grains and meal and hay consumed, with grass at 18*s.* a ton cut and delivered at the cowhouse, have cost 9*s.* to 12*s.* weekly; the loss on sales has been at least 2*s.* a week per cow: and taking rent of sheds into account, the cow has cost more than from 13*s.* to 15*s.* a week. It is plain that wherever the average yield throughout the year falls below ten quarts a day, there must be a loss, if the cowkeeper does not receive a higher price than I have named.

The dairy-farmer who disposes of his milk at the nearest station for 2*d.* a quart, makes perhaps more of it than he could by cheese or butter, and he saves a good deal of the labour for which, as a cheese or butter farmer, he has hitherto had to pay. But it is right to warn any one who thinks to begin dairying near town in any locality where the industry is new, that his labour-bill will be a very great difficulty in his way. I need not, however, illustrate this at any greater length. Enough has been said to show that the profits of the honest wholesale cow-keeper are earned with difficulty.

The commercial aspect of this subject as distinguished from the agricultural, must be treated very shortly in this Journal. I have little to add to the information collected two years ago for the Society of Arts. From returns then made by asylums, schools, and institutions (not infirmaries, or hospitals, or workhouses, where special dietaries exist), it appeared that 2-5ths of a pint of milk a-day is the average quantity which a mixed population of healthy people consumes when its diet is under medical direction. And in some places the actual consumption approaches this quantity. Thus the town of Stirling, which has a population of 12,500 persons, was then supplied by 190 cows in

the town, besides 200 gallons a-day of buttermilk (a most nutritive and useful food) brought in by rail and otherwise. There was here a cow to every 60 people; and this, at the average of 800 gallons yearly to every cow in milk gave 100 imperial pints per annum to every man, woman, and child, or about 2-7ths of a pint a-day a-piece, very nearly the medical standard; and indeed exceeding it when the 200 gallons a-day of buttermilk are taken into account, for this would furnish half a pint a-day to the 3200 belonging to the labouring class in a community of 12,000.

The English town of Mansfield may be fairly compared with the Scottish town of Stirling. It contains about 10,000 people, and 108 cows. Taking these at 800 gallons a head per annum, and adding 20 gallons of skim milk daily, of which I heard as being sold in the outskirts of the town, there were only nine gallons (72 pints) per annum for each inhabitant, or 1-5th of a pint a-day a-piece—one half the medical standard.

Take, now, Bedford:—It contained in 1865, at the time of my inquiry, about 15,000 people, and 100 cows: and 123 gallons of milk, the daily produce of about 50 other cows, were brought in daily by railway. 150 cows to 15,000 people are one cow to 100 people, about the same as at Mansfield; and this, at 800 gallons a cow, is about 70 pints a year, or 1-5th of a pint a-year a-piece—one-half the medical standard.

If then 1-5th of a pint a-day be taken as the quantity, not which ought to be, but which *is* consumed in general by a mixed population of English people, then the 3,000,000 of our London population require 300,000 quarts a-day; and this, at 10 quarts a-day from each cow or rather from each stall, indicates 30,000 stalls occupied by cows kept upon the London plan as needed for the London milk supply. And if people were fed according to the medical rule of our selected institutions, twice this number of stalls, representing about three times that number of cows per annum, would be needed for the supply. At the time of my inquiry into this subject, two years ago, I ascertained that the usual number of cows kept within the metropolitan district was about 24,000; and between 30,000 and 40,000 quarts of milk a-day, in addition to the town production, were then being brought in from the country, which must have needed 3000 or 4000 cows for its production; so that the total number of cows then engaged in supplying London fell considerably short of the number indicated by the average of such towns as Bedford and Mansfield.

During the cattle plague more than half of the 24,000 London cows disappeared, and the railway delivery of milk rapidly increased, and though, as the London cowhouses have

again filled, the country trade has somewhat declined, yet the quantity still delivered is very great indeed.

The following table, of which the figures have been most obligingly supplied to me by most of the leading metropolitan railways, indicates the growth and, in some measure since the spring of 1866, the decline of the trade.

MONTHLY DELIVERY OF MILK (IMPERIAL GALLONS) BY METROPOLITAN RAILWAYS.

	Great Western.	North Western.	Great Northern.	Midland.	Great Eastern.	South Western.	London and Brighton.
Jan. 1865	8,954	14,168	14,904		76,818		13,547
Feb. ,,	9,460	13,024	15,276		76,846		13,872
Mar. ,,	14,590	12,752	16,416		74,783		14,891
April ,,	11,775	10,242	18,216		84,452		17,424
May ,,	13,050	6,624	20,124		69,891		17,258
June ,,	14,932	6,656	20,392		68,212		21,992
July ,,	12,791	8,480	20,556		82,525		19,239
Aug. ,,	23,474	23,152	20,952		70,005		17,322
Sept. ,,	59,782	76,160	21,924		101,212		22,251
Oct. ,,	103,214	123,952	26,016		112,890	116,560	23,483
Nov. ,,	116,802	116,700	27,576	3,760	88,714	112,800	19,394
Dec. ,,	140,293	148,296	27,180	10,120	109,325	116,750	21,816
Jan. 1866	143,600	155,952	30,348	23,620	95,269	97,812	21,604
Feb. ,,	186,764	143,880	31,608	20,740	106,483	107,772	22,884
Mar. ,,	201,686	158,484	33,516	21,980	116,700	116,352	26,663
April ,,	211,016	142,188	35,516	18,100	145,647	161,448	30,725
May ,,	285,918	125,208	39,492	15,000	120,993	133,476	35,508
June ,,	221,851	95,352	37,512		120,178	135,516	42,696
July ,,	166,892	80,304	39,012		109,973	164,268	34,171
Aug. ,,	153,766	64,572	38,292		109,431	112,716	30,813
Sept. ,,	110,159	53,772	35,280		109,362	137,976	29,710
Oct. ,,	115,834	63,072	36,444		107,955	114,024	34,399
Nov. ,,	120,346	59,936	35,316		107,542	111,276	28,717
Dec. ,,	126,819	66,564	33,336		109,295	119,388	28,792
Jan. 1867	118,870	63,480	31,068	12,528	110,048	118,824	32,649
Feb. ,,	131,210	54,648	29,784	16,368	102,500	112,152	27,478
Mar. ,,	156,579	61,908	37,128	16,284	106,228	124,584	30,086
April ,,	122,979	60,696	36,180	16,152	106,510	120,348	24,680
May ,,	160,628	54,156	38,316	12,816	106,968	126,720	30,691
June ,,	125,499	49,800	40,212	10,572	109,107	129,600	30,027
July ,,	112,233	49,752	43,392	11,676	105,542	132,012	39,457
Aug. ,,	118,720	39,084	42,744	14,244	105,487	126,576	42,240
Sept. ,,	95,965	38,088	39,788	16,764	109,605	118,224	38,051
Oct. ,,	86,668	50,640	40,728	13,068	107,561	124,140	59,526
Nov. ,,	149,510	50,652	38,772	19,908	128,084	121,176	32,630
Dec. ,,	123,121	60,528	37,884	19,920	126,784	125,916	31,739

It is this aspect of the subject which more than any other is directly interesting to the readers of this journal. So large an increase in the quantity of milk brought up to town as took place during the cattle plague indicated of course a very considerable alteration in the management and industry of many a dairy district. And as the facilities offered by the London railways

increase, and the methods of transmitting milk with safety are improved, so no doubt we may expect an extension of the trade between the London milk dealer and the country dairy farmer. The latter cannot generally make more than 7*d.* a gallon by cheese or butter and pork or bacon; and if the London milk dealer will give that or a little more at a distant railway station, it may be for the interest of the farmer to give up the expense and labour of dairy management, and in their place incur the risks and costs of a new and unaccustomed trade. The exchange has not always been satisfactory: for until, by cooling the milk before starting and by perfectly filling the cans and carrying them without excessive shaking, the liabilities to souring and spoiling on the road have been diminished or avoided, great losses, especially in hot weather, have been and will be suffered.

I say nothing here of other risks which interfere with the extension of this trade—the risk of bad debts which the farmer runs and the risk of adulterated milk which the dealer runs—for these are common to all commercial dealings. A London wholesale cowkeeper will receive from his customer who comes to his cowhouse and milks his cows 3*d.* or 4*d.* an imperial gallon more than the farmer will receive for country milk delivered, with all its charges paid, at the London terminus; not only because it is the produce of specially fed cows and perfectly fresh, but because it is certain to be unadulterated. I was told the other day by a London milkman that every barn gallon of such milk as his would "*bear*" a quart of water without any chance of the adulteration being detected by an ordinary consumer; and he had known that quart put in before the milk had left the country farm on its railway journey. The mere risk of such dishonesty is enough to lower the market value of the article to dealers, who probably would rather benefit by some such dilution than suffer from it.

I add from the information laid by Mr. Brooks of the London and North Western Railway before the Milk Committee of the Society of Arts the following particulars; which, being indicative of the management of the traffic on that one railway, are instructive on the subject of the railway milk traffic generally.

The milk is brought to Euston Square from all railway stations between London and Northampton; being conveyed (in cans provided by the senders) on open carriage trucks. The charge for a distance not exceeding 100 miles is 1½*d.* per imperial gallon, and when the distance exceeds 100 miles 2*d.* per gallon. When the great increase in the traffic commenced, milk was sent up from places 180 and 200 miles distant—from Huddersfield, Macclesfield, &c. The greatest distance from which milk is sent now is about 95 miles. The carriages which are used for the conveyance of the milk are as well constructed

as they can be in respect of the springs, as it is desirable that the milk be as little shaken on the journey as possible. —The French milkcans are about half the size of those used here. Our cans are much too large and too heavy to be loaded and handled by one man. Their shape too hinders close packing; they are broad at the bottom and tapering towards the top. The French cans, from their cylindrical shape, can be packed with greater economy of space. The French milk trucks are very much like the narrow-guage sheep-truck used in this country, with two floors, one above the other—two tiers, in which a great number of cans can be packed, and there is a circulation of air all round them. On the other hand the French cans are heavier per gallon of their contents than the English; and it is not likely that the former will be adopted.

It is a stipulation with the dealers that their men shall assist the railway porters in unloading the trucks, because the cans are too heavy to be handled by one person. The weight of a can filled with milk is nearly 200lbs. The trade has come to be of such an extent as to lead to the despatch of special trains for the purpose; and the milk is brought to the various stations in time for them. One train arrives in London at a quarter to twelve in the forenoon—for the afternoon supply: and the second train arrives about half-past eight in the evening—for the next morning's supply. During the time of the greatest scarcity of milk, an arrangement was made for bringing cream from a distance so remote as Carlisle; and that was done by the article being placed in small cans—much smaller than the French milk-can—and carried suspended in the truck; but, when it arrived in London, it was found that the cream was reduced almost to the consistency of milk. That trade was therefore abandoned.

Mr. Brooks, in reply to the questions of the committee, stated that no other means are now taken by the railway company to develop the milk trade than the putting on of more trucks and eventually establishing special trains for it. He says that those who make complaint about the rates of carriage cannot have calculated the price per ton at which the company carry the milk, or they would have found that the milk, including the weight of the cans, is carried a distance of 100 miles for 1*s.* per cwt. When the milk train arrives the dealers assist in the unloading of the vans, and the milk is carried away in the dealers' own conveyances. He was not aware of any other means by which the milk could be more promptly or more rapidly distributed than it is under the present system.

Harrow-on-the-Hill, January, 1868.

IV.—*Ploughing-in Green Crops.* By Peter Love.

Thirty years ago the ploughing-in of green crops was more studied and practised than at present, the introduction of guano, nitrate of soda, &c., and the extraction of fertilisers from refuse of every description by the aid of chemical science having since then done much to meet the wants of the farm. The high price of meat has also induced the farmer to consume all his green crops by stock. The question, of course, turns upon whether the crop grown by ploughing-in the whole plant more than compensates for the beef or mutton that might have been produced from its consumption by stock. With present prices such a result is exceptional.

I remember that it was pretty generally recognised among intelligent farmers, that the ploughing-in of 18 tons of turnips per acre, after being crushed by a clod-crusher, gave 12 bushels of barley more than if the said turnips had been first passed through the animal, and the elements to form mutton and wool extracted; it is also pretty certain that a ton of turnips will produce 14 lbs. of mutton, and about 1 lb. of wool, but the outlay on sheep, risk of losses, and cost of attendance, must be taken into account.

I have only once tested the difference of carting all off, feeding on, and ploughing-in turnips; this was early in 1842, when beef and mutton sold by the carcase at from 4*d.* to 6*d.* a pound, and roots were superabundant.

A 12 acre field of light loam subsoil, the Northampton ironstone, had been manured with about 16 tons of good fresh farmyard manure per acre, ploughed-in 10 inches deep during the winter, with about 5 inches of wheat stubble, afterwards thrice cultivated in the spring, harrowed and rolled, then ridged up, and two quarters of bone-dust (well fermented after wetting with urine) drilled in per acre under the seed; the produce was a little over 18 tons of turnips per acre. The crop on 3 acres was all carted off the land, that on 7½ acres eaten by sheep, and that on 1½ acres crushed with a Crosskill's clodcrusher, then harrowed across the rows, re-crushed and ploughed-in 6 inches deep. The part eaten off was ploughed only about 3 inches deep; that where the turnips were drawn 6 inches; the whole was sown with oats, and produced as follows: where turnips were drawn, within a peck, under or over, of 7 quarters; where eaten, 9 quarters; where ploughed-in, over 11 quarters per acre. Each piece was carefully kept by itself, and all threshed the same week, and sold to the same man, on the same day, at 1*l.* per quarter. They were harvested without wet, and weighed 41 lbs. a bushel.

If we can accept the result of this one experiment, it tends to show that the virtue of the manure left in the excreta of the sheep is about equal to what is expended on making mutton and wool besides maintaining the animal's heat and existence. If we take the 2 quarters of oats as a fair equivalent to the 12 bushels of barley before mentioned, it follows that the entire manurial value of 18 tons of turnips ploughed-in is equivalent to 24 bushels of barley, or 32 of oats; or if these are valued respectively at 32*s.* and 24*s.* a quarter, is 4*l.* 16*s.* for 18 tons, or about 5*s.* per ton; or 2*s.* 6*d.* per ton for the excreta left by fattening sheep.

Swede turnips, apart from their value as feed, are not well suited for ploughing-in as manure; they do not rot down well, though they be smashed with mallets. The clodcrusher will not break them, and the tops will strike root and grow if any part of the crown of the bulb is left adhering to them.

The results obtained by ploughing-in turnips in 1842 induced me to try white mustard in 1843 on a small field of 8 acres; soil a stiff, poor clay, upon blue lias clay subsoil, as foul with twitch as possible; it was ploughed about 7 inches deep in the winter, then scarified with broadshares about 3 inches deep the last week in March, and after being well harrowed, sown with white mustard seed by a broadcast seed-barrow, at the rate of a bushel to 3 acres, covered in by very light seed harrows. This crop was just breaking into bloom the last week in May, and 26 inches high, when it was ploughed-in about 4 inches deep, and 100 bushels of lime (after being slaked with salt and water) applied per acre; then after one turn of the Norwegian harrow, re-sown with mustard, care being taken that all ploughed-in *within the day*, should be *re-sown on the same day it was ploughed;* all was finished on the last day of May.

On the 8th of July, we began ploughing-in 6 inches deep this second crop, which was above 46 inches high; about accomplishing this I had some misgivings at first, but managed it well by attaching a heavy block of wood, 12 inches wide, 18 inches long, drawn by a chain attached to the large whippletree, and dragged just under the plough beam, a few inches in advance of the coulter. This further served to regulate the depth instead of a wheel. We had also the usual drag weight and chain to lap the whole under the furrow. About six furrows at the last must be done with the horses at length, or else when the land horse returns on the same tract as he went, he ricks and entangles the long stems so together, that they lap round the coulter and choke the plough, causing much trouble, and making the work rough and untidy: by putting the horses "at length" there is no trouble, except with the last two furrows. Immediately

after ploughing we gave one turn of the Norwegian harrow, then re-sowed the mustard as before. The whole field was finished on the 12th of July.

The third crop was just breaking into bloom on the 24th of August, and the length above 5 feet; this was ploughed-in 8 inches deep, with four horses at length, followed by a two-wheel presser, following only one plough, thereby giving each furrow a double go. After one turn of the Norwegian harrow, the land was left to settle down for the future wheat crop. As for the couch grass, except a few blades in the first crop of mustard, we saw no more of it, except the rotten roots, as we were ploughing the last crop in. After one turn of the Norwegian harrow in the first week in October, the land was drilled with two bushels of red wheat per acre, a light harrow following, then twice rolled with Crosskill's heaviest crusher: it was crushed again in March. The produce at harvest was all that any man could desire, and perfectly clean. After one 8 inch winter ploughing, and a shallow scarifying in the following March, it was drilled with white oats and clover seeds; the crop of oats was magnificent, and in some parts injured the seeds. Thenceforth this field, which had borne a very bad character, behaved as well as the best. During the succeeding seven years of my occupation of this farm, if I had to deal with any piece of very foul strong land, I cleaned it in this way; but if it was moderately clean, I consumed the mustard with store sheep and lambs. Mustard crops grown after those eaten off will not be so heavy, but with a very little corn or cake they will keep from 16 to 24 sheep per acre, half ewes and half lambs, from the middle of May to the end of August, or even later. The ewes (or stores) should follow the lambs in a separate pen; a fresh piece should be given every day, and the piece fed off should be ploughed and sown the same day, because in dry seasons whenever the land is naked the moisture is soon dried up; thus there will be a regular succession, and also the almost certainty of a plant.

The application of 1 cwt. of nitrate of soda to the first crop will almost double it, and, of course, much increase the two following crops, as well as their power to smother the twitch or other weeds. I know several persons who have made attempts at this system, but through dilatoriness in ploughing and re-sowing have failed to obtain a regular plant. I believe the Norwegian harrow to be indispensable to success, because it thoroughly pulverises the soil at once, so that lengthened exposure of the different surfaces is avoided, and much moisture saved that would be lost by repeated harrowing and rolling. If in a wet season rain falls and delays the sowing after any part is ploughed, this

delay gives the half-dead twitch time to revive before the smothering influences of the next crop can overpower it; so that in either wet or dry seasons the mainspring of the whole system is promptness and punctuality in performing every part of the work thoroughly well, with the least possible mauling of the soil, so as neither to make dust in the one case, nor mortar in the other.

I need scarcely say that trifolium, tares, trefoil, Italian rye-grass, or any other forward crop may be grown as a first crop, and after this is fed off, two crops of mustard may still be obtained either to eat off or plough in. The difficulty, nay, almost impossibility, of cleaning strong land in a wet season is well known to all practical farmers. Now I venture to affirm that the foulest and poorest possible piece of land (sand, perhaps, excepted) may be cleaned by growing white mustard, with 1 cwt. of nitrate of soda per acre applied to the first crop, and three crops in succession ploughed-in, as before stated, let the season be either wet or dry. The soil will be left as capable of bearing a crop as if 20 tons of farmyard manure had been applied to a bare fallow. A few days ago I passed a field of strong land, which twelve years ago took two years of bare fallow to clean it, and as far as I can judge, it is now worse than it was then; my fingers itched to have a turn with my friend mustard, and see if we could not digest all the twitch into food for future crops.

Whether sandy land, the natural parent of couch grass, could be cleaned in this way I do not know, but I do know that all bog, fen, or peat, light gravel, or loam, and all clays can. It is almost superfluous to contrast the expense of this system against that of the bare fallow; but the case may be roughly stated as follows:—

Cost of an acre of Bare-fallow manured with twenty tons farmyard manure.

		£	s.	d.
	Winter ploughing ..	0	12	0
March ..	Scarifying and harrowing..	0	4	0
April ..	Cross ploughing ..	0	12	0
June ..	Summer ditto ..	0	10	0
July ..	Three scufflings, &c.	0	12	0
August	20 tons dung and applying	5	0	0
,,	Ploughing in dung	0	12	0
		£8	2	0

An acre producing three crops of White Mustard and ploughed in, &c.

		£	s.	d.
	Winter ploughing ..	0	12	0
March ..	Scarifying, harrowing and sowing ..	0	5	0
May ..	Ploughing in and resowing..	0	17	0
July ..	Ditto ditto	0	17	0
August	Ditto 8 inches deep	0	16	0
,,	Pressing and Norwegian harrow ..	0	5	0
	1 bushel mustard seed	0	15	0
	1 cwt. nitrate of soda	0	16	0
		£5	3	0
	Saved by this system	2	19	0
		£8	2	0

When land is partially cleaned in the autumn, it may be perfectly cleaned and manured by growing three crops of mustard, to be folded; an acre will then keep an average of 20 sheep for 15 weeks, which will give a result as follows:—

WHITE MUSTARD. DR.	£	s.	d.	CONTRA. CR.	£	s.	d.
Cost of autumn cultivation ..	1	0	0	20 sheep kept 15 weeks at 4*d*. a week each	5	0	0
Ditto as above for 3 crops ..	5	3	0	Value of excreta left	2	10	0
Total cost of cultivation ..	6	3	0				
				Gross return	£7	10	0
				Cost of cultivation	6	3	0
				Leaving to meet rent and taxes a balance of	£1	7	0

I therefore conclude that plants when at their greatest green bulk are worth about 5*s*. a ton to plough-in as manure, and if palatable for stock, they will make about 14 lbs. of meat, and the excreta left will be worth, as manure, about 2*s*. 6*d*. per ton of food consumed. Mustard, or any plant of rapid growth which attains a smothering bulk, the seed of which costs little per acre, is best fitted for being ploughed-in as green manure, especially when the object is at the same time to clean the land.

V.—*Ploughing-in Green Crops.* By G. MURRAY.

MY experience of ploughing-in green crops includes much variety of soil and difference of climate, and of rainfall.

In the north-western counties of Scotland, where dairy farming is extensively practised, the whole turnip-crop is got up by the middle of November and all drawn off and consumed by cattle in the yards. Here the farmers are very particular to have the turnip-tops regularly spread over the land and at once ploughed-in, the depth of furrow being never less than 5 inches: in this state it remains till the month of January, or later, when the land is generally sown with wheat, and heavy crops are grown. I have tried the same system in both the southern and midland counties of England, both after mangold and turnips; but have always found that, unless artificial manures were used in considerable quantities, the crops were generally deficient. I cannot account for this marked difference, except it be that the greater rainfall of the north accelerating the solubility of the mineral elements which are contained in the leaves, presents them at once in that readily assimilative form, which is necessary in the case of spring-wheats that occupy the land for but a short period. (It is, however, generally supposed that green-manuring is most successful in a

dry climate.) Or again it may depend on the quantity of tops, which varies considerably as a general rule, an increased rainfall producing a greater weight of tops: the quantity is likewise greater when early storing is practised. I find the average weight of tops left by a good crop of mangold or swedes to be about 4 tons per acre when taken up during the early part of November.

Where potatoes are much cultivated, the haulm or top should invariably be returned to the soil, either by being ploughed-in or by adding it to the manure-heap, as in vine-growing districts the prunings of the vines are always returned to the roots of the trees. I have frequently noticed the more observant and industrious of our cottagers carefully collecting and at once digging-in the tops of their early-lifted crops of potatoes, in order to supply food for the succeeding crop of cabbages or brocoli, which on well-managed cottage gardens generally follow an early-lifted crop of potatoes. Of green-manures, that have been partially consumed on the land, the most familiar in practice are clover-stubble, pastured-seeds, rape or coleseed, rye, vetches, &c. These, when partially returned to the soil in their green state, produce a double effect, as they act both chemically and mechanically—chemically, as on decomposition they form food for a new race of plants; mechanically, as in strong clays they increase the porosity of the soil, and by allowing the air to permeate more freely heighten the temperature, whilst on light sandy land the roots bind the soil together, imparting firmness and tenacity. All who are practically acquainted with the management of light lands know the difficulty and uncertainty of growing a good crop of wheat when the previous crop of clover has failed; whilst on every class of soils the wheat-crop is greatly benefited by the ploughing-in of a good crop of clover or grass, particularly where early ploughing is practised. On light land furrow or wheel pressing is beneficial, and the land should remain a considerable time after ploughing before the seed is deposited, otherwise the vegetable acids which are formed during the earlier stages of the decomposition of the green-manure prove injurious to and often endanger the life of the young plants. Experience and observation confirm me in the opinion that to this cause may be traced the failure of or thinning of the young wheats.

On a light-land farm, managed on the five-course system with barley following wheat, we have for several years adopted the practice of mowing or cutting the wheat by machine, and as soon after harvest as circumstances would permit, the land was autumn-cultivated and thoroughly cleaned from weeds. If the horses can be spared from preparing the clover-layers for the wheat-crop, the land is at once ploughed and sown thickly with common turnip-

seed, or a mixture of turnip, rape, rye, or winter oats, or any other quick-growing crop. If the land is ploughed, it should either be harrowed or rolled previous to the seed being sown, and the seed lightly covered by one tine of a light harrow: this insures an even braid, and the seeds vegetate more quickly than when they are deeply covered. If the land cannot be ploughed, the seed is sown after the cultivator: with an early harvest and a mild autumn and fore-winter we get a good covering of vegetation on the ground by the end of October, which, as soon as wheat-seeding is completed and the horses can be spared, is at once ploughed-in; if this can be done before any severe frosts set in, the benefit to the land is all the greater. The land remains in this state until the season for barley-seeding arrives, when either the plough or cultivator is used in preparing the seed-bed. The vegetable matter has by this time become decomposed; the land not only works better, but is considerably enriched in manurial elements.

The principal plants grown in this country, exclusively for green-manuring, are those of a rapid growth, possessing little value as food for stock, and the seeds and cultivation of which are inexpensive. Amongst the most prominent of this class are the mustard, spurry, buckwheat, lupine, &c., which attain to a good height in a short period, and succeed best on light soils. My experience of growing crops of this description for the sole purpose of being ploughed-in was principally gained on a light barren sand, resembling the Bagshot Heath sand. This hungry soil was particularly deficient in vegetable matter, and required manuring for every crop. During the time I lived on this estate a farm was taken in hand which had become quite overrun with couch, thistles, and other weeds. A portion of the farm lay in small enclosures; the tenancy expired at Michaelmas, and the first operation during the winter was to remove a great portion of the old wide hedge-rows and to reduce the dimensions of the rest. In doing this fields were thrown together which had the previous year been under a variety of crops: the whole was deeply ploughed in the early part of winter, and was not again disturbed until the following spring, when it was cross-ploughed and cleaning operations proceeded with; however the cleaning could not be satisfactorily accomplished until the season was too far advanced to give a fair chance to a turnip-crop on the land, as it was in so exhausted a state. We therefore determined to try a crop of mustard to be ploughed-in: this we sowed from the common clover-seed box rather thickly. The crop came up strong and grew rapidly, and in about six weeks from the date of sowing had attained a height of from 12 to 18 inches when it was ploughed-in. We had at first considerable difficulty in covering the large quantity of stuff; but by using a heavy iron roll, working in

the same direction in which the plough would follow, and by attaching a chain and weight to the coulter of the plough (the weight trailing in the furrow at about the middle of the mould-board), the whole of the crop was completely covered: the work was firmly pressed by a two-wheel presser, following every two ploughs. When this operation was completed, the land was allowed to remain about three weeks before the wheat was put in. The seed was deposited at a fair depth by a Suffolk drill, traversing the field at right angles to the plough, the weather at the time being favourable: it was immediately afterwards gone over with a Crosskill's clodcrusher, which left it in a very firm state. The wheat, "Essex Rough Chaff," came up strong and healthy, and stood the winter remarkably well, and at harvest produced a crop of first-rate quality, which averaged 4½ quarters per acre over the whole of the field. As already stated, the land had been under a variety of different crops the preceding year: one portion of it had been wheat, and here the crop was barely 2½ quarters per acre. Leaving the neighbourhood before the succeeding season, I had no opportunity of judging of the following crops.

Vegetable manuring produces the most marked effect on light sandy soils and in dry climates. Mr. R. Russell, in his paper in the 'Royal Agricultural Society's Journal,' on the Influence of Climate on Cultivation, says:—"The decaying vegetable matter seems to improve the physical texture of the soil by its attraction for moisture; it also, to some extent, regulates the supply of ammonia to the plants by only slowly yielding it up—a matter of much economy in the feeding of plants. These influences combined have the effect of sustaining vegetation in a comparatively healthy state during periods of drought.*"

On strong lands green manuring is less important, their retentive character enabling them to retain a sufficient supply of moisture to maintain the plant in a progressive and healthy state during long periods of drought. These soils also possess the power of storing up a quantity of ammonia in an insoluble state, which is taken up by the roots according to the requirements of the plant.

Buckwheat is particularly well adapted for the purpose of green-manuring on sandy soils, from the rapidity of its growth and the large quantity of succulent foliage which it is capable of producing in a short time. The plant has not hitherto received the amount of attention which it merits.

A description of the use of green-manures would be incomplete without a detailed account of the use of wrack or

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* Vol. xx. p. 164.

seaweed. Where this manure is abundant, the rent of arable land is often enhanced from 30*s*. to 2*l*. per acre, if accompanied by the privilege of gathering the seaweed. On the west coasts of Scotland and the seaboard of the Frith of Clyde this species of manure is largely used by the arable farmers. The autumn and winter storms drift it in from the wide waters of the Atlantic, and, according to the direction of the wind and state of the tides, it is washed on the sandy beach or amongst inaccessible rocks, all the way from Troon harbour, on the north-east, to the mouth of Loch Ryan, on the south-west. As soon as the tide recedes all the hands on the farm are set to work immediately to remove the wrack left by the receding waters. It is all collected and carted out of the reach of the next tide, otherwise with a change of wind it is liable to be swept away and carried by the next tide to some distant part of the coast. The general practice is to cart the seaweed in its green state direct from the beach on to the land, where it is spread on the stubble at the rate of from 20 to 30 tons per acre, and at once ploughed-in, in preparation for the succeeding crop. In this part of the country potatoes are largely grown: in this way, without the addition of farmyard or artificial manure, heavy crops are often raised, though they are sometimes of inferior quality.

Throughout the greater part of Scotland the wheat plant does not succeed well after a clover-layer: it then commonly follows a green crop—potatoes or turnips—the land receiving in preparation from 10 to 15 tons per acre of farmyard manure. I have known instances where the tenant, unrestricted as to cropping, had such an abundant supply of seaweed, that the land has been under wheat and potatoes alternately for a long series of years without deteriorating the value of the land or decreasing the quantity of the produce, the tenant paying a rent of upwards of 5*l*. per acre.

Elvaston, Derby.

VI.—*Ploughing-in Green Crops.* By W. E. Wright.

The green crops we treat of may be either a part or the whole of cultivated crops, incorporated with the soil in their succulent state, to act as fertilisers for subsequent crops, and especially those raised upon the spot with the express design of being used as a manure. Merely to return to the soil its produce might seem to an unreflecting person, or to one unacquainted with agricultural chemistry, utterly incapable of imparting fertility; and, certainly, if plants derived all their substance out of the soil,

and gave it back in the same state of chemical combination in which they drew it forth, they would affect the soil none otherwise than by the accidents of their culture. But by far the largest portion of their bulk is derived, not from the soil at all, but from air and water, and the whole of this is contributed by green manure as clear gain preparatory to the succeeding crop; whilst the remaining portion, though extracted from the soil, is brought into new affinities, assuming more available forms than before, so that even this, as returned to the soil by green manure, is in a more advantageous condition for rapid assimilation than if it had not recently played a part in vegetable growth. The plants most appropriately employed for green manuring are those that derive their support principally from the air. As the organic portion of these plants decays in the soil, the inorganic part—that is, saline and earthy matter, of which all vegetables contain a considerable quantity—is liberated. Thus living plants obtain from the remains of former races buried beneath the surface, a portion of that inorganic food which can only be derived from the soil, and which, if not thus directly supplied, must be sought for by the slow extension of their roots through a greater depth and breadth of the earth in which they grow. The addition of manure to the soil, therefore, places within the easy reach of the roots, not only organic, but also inorganic food.

The use of green manure, though a very important and powerful means of enriching the soil, and though known and practised by very many farmers of the present day (in marshland), has received surprisingly little attention from scientific agriculturists. Among the farmers, generally, residual green manure from cultivated plants is known principally in the form of clover ploughed up. Old pastures, moreover, when broken up and converted into arable, prove abundantly that the soil has been enriched, not only by the death and slow decay of bygone plants, but that the leaves and roots of the grasses, living at the time, afford by their gradual decomposition an immediate supply of food for cereal crops for a succession of years.

The chief causes of the neglect of green manure are,—1st, the want of a due appreciation of its value; 2nd, the lateness of the harvest and consequent slowness of growth between the time of sowing the seed and that of ploughing-in the crop; and 3rd, the carrying out to an unwarrantable extent the principle that green vegetable substances, to be profitably employed as manures, ought to be in the first place used as food for animals.

The use of special green manure can never supersede the necessity for farmyard manure; yet it is a resource of great value in all situations where ordinary manures are scarce or very expensive, and is peculiarly applicable upon stiff-clay soils.

The plants which are more suitable for general purposes are white mustard, tares (2nd crop), and rape; but, whichever be employed, it ought if possible to be ploughed-in, either while it is passing into flower or is in actual bloom, for it then possesses its maximum of easily soluble and alimentary matter; it should also be deposited only deep enough to prevent the drying action of the air, and not so deep that the free play of oxygen, which is requisite for decomposition, be excluded. All, or very nearly all, known plants impoverish soil principally during the period of their forming and maturing their seeds, while the best of the fallow crops, being grown for the succulent food of either their roots, their leaves, or their stems, are hindered from acting impoverishingly. The ground to be benefited by the ploughing-in of green crops should be capable of bringing them forth, if not luxuriantly, at least with such abundance as to furnish complete shade during their growth, and sufficient vegetative matter to occasion a rapid fermentation when buried; this species of manure is more appropriate for the preservation of good soils in a state of fertility, than to the improvement of the exhausted or light soils; for on such land they grow too feebly to produce much effect. This, probably, will in a great measure account for the comparative rarity of the practice on extensive farms containing tracts of poor land.

N. Runcton, King's Lynn.

VII.—*The Food of the People.* By Harry Chester.

How the people are to be fed is the most important question of to-day; and none are so concerned in its solution as those who are connected with land, for they not only require to be themselves fed, but are the principal producers of food.

In November, 1866, the "Society for the Encouragement of Arts, Manufactures, and Commerce," appointed a Committee to inquire and report respecting the "Food of the People." The Committee, which commenced its sittings in the last month of that year, is still engaged in its work; and the object of the present paper is therefore to place before agriculturists, not a final nor complete statement of the results of the inquiry, but, simply, in a compendious form, a few ideas which are founded on those results, as far as they had been obtained to the close of 1867.

The Right Hon. Henry Austin Bruce, M.P., was appointed Chairman of the Committee. It set to work by endeavouring to define some limits within which its inquiries should be princi-

pally made; and it was determined to undertake more particularly the subjects of "Meat," "Milk," "Fish," "Cooking" and "Frauds"—frauds in the sale of food, whether by adulteration, or by the use of false weights and measures. In connexion with all of these subjects the attention of several meetings of the Committee has been devoted to the "Food markets" of London.

The subject of "Meat" is, of course, of prime importance to the farmer. He has long known that the importation of foreign grain is capable of an almost indefinite extension; but the importation of foreign meat has seemed a more difficult matter. Now, however, it appears as if the whole earth was preparing to send us animal food to compete with the flocks and herds of the United Kingdom; and it is important that our agriculturists should inform themselves how far this is likely to be realised, and what may be its effect on them.

Preserved Meats.—The importation of live animals is attended by so many evils that it seems at least as likely to be checked as to be seriously increased, but the importation of dead meat is capable of almost unlimited extension. This may be in the form of cooked meat, such as the "Ramornie" stewed beef from Australia; or of salted meats, such as are prepared by Dr. Morgan's method of injection; meats treated with the bisulphate of lime on Dr. Medlock's plan; the various extracts, commonly called Liebig's extract of meat; the frozen meats, a large consignment of which, valued at 15,000*l.*, is now on its way to London from Australia; or some other of the thousands of modes by which science has succeeded, or may succeed hereafter, in overcoming the natural tendency of meat to putrify. This tendency may be said to be due to three principal causes. 1. Contact with oxygen contained in the air. 2. Moisture. 3. A temperature above 50° Fahr. Get rid of air and moisture, and even the higher temperature will bring no risk of putrefaction.

The "Ramornie" stewed beef, from Australia, commands a rapid sale in the Metropolis. The retail price is about 7*d.* a lb., for the prime parts of excellent beef, without bone, and already cooked. This is about equivalent to raw beef steak at 4*d.* a lb. The first consignments were considered to have too much fat, and to have been cooked at too high a temperature. An eminent medical witness informed the Committee that a temperature of 170° should not be exceeded in the cooking; that any greater heat was unnecessary, and tended to render the beef indigestible and less nutritious by hardening its fibre. The "Ramornie" beef is not salted, but simply stewed, and then hermetically sealed in canisters from which the moisture and the oxygen have been driven by the application of heat just before the sealing of the tins. Thus treated, the meat will keep in the

tins for years, and may be eaten with a little salt, and any other accompaniments suitable for cold stewed beef. The later consignments are better than the first. The cooking has been done at a lower temperature than formerly, and there is less fat.

Dr. Morgan's method of preserving meat is by the injection of brine. This may prove to be the best possible method of salting meat; but it is desirable to avoid, if possible, the use of overmuch salt; a little salt is useful, a great deal is injurious, as it hardens the fibre, and occasions waste. The Food Committee received from the Admiralty a copy of the Reports presented to their Lordships by the captains of a considerable number of vessels in which meat salted on Dr. Morgan's plan had been served to the men alternately with meat salted in the ordinary way by steeping and rubbing. The reports were very various. The Lords of the Admiralty appeared to regard them as in the main unfavourable to Dr. Morgan's plan; but the Food Committee, looking to the prejudices likely to be excited by the introduction of a novel article of diet among common sailors, have expressed a somewhat different conclusion, and desire to see the experiment more fully tried. The meat in question, being killed and injected at Deptford, was doubtless very good meat; but that which was killed and injected in South America, is of very inferior character. Nevertheless it commands at Liverpool a ready sale, at about 3*d.* a lb.; and is consumed to a considerable extent in Ireland.

Dr. Medlock's method of preserving meat by the application of the bisulphate of lime has been partially tested with good results, and is now undergoing a crucial test at the house of the Society of Arts. The result of this experiment will belong to 1868. There seems, however, to be little or no doubt that the bisulphate of lime may be usefully employed in slaughter houses, butchers' shops, and larders, dairies, cheesehouses, fishmongers' shops, applerooms, &c., to preserve meat, fish, milk, cheese, vegetables, &c., at least during moderately short periods. The liquid is very cheap, easily applied and to be purchased through any chemist.

Liebig's Extracts.—" Liebig's Extract of Meat," as it is called, is rapidly growing in favour with the educated classes in London. Strictly speaking, it is not meat, but merely the soluble matter of meat, without fibrine or albumen. The extract may be regarded as dried beef-tea, though there may be albumen in the latter, and there is none in the " Extract." When the Extractum Carnis, or the beef-tea, is said by a medical witness not to be " Food," we see, by his subsequent explanations, that his meaning is that the extract is not a perfect food—such a food as will alone support life. It contains only some, not the whole, of the ele-

ments of meat. Add, however, to the extract some other substance which contains fibrine and albumen—for example, eggs or lentils, or ripened grain seeds, *i.e.*, bread—and you have the full equivalents of meat. No one, who has been in the habit of taking the extractum carnis regularly as a part of his food, can doubt that it has helped to feed him. If we had discovered a certain method of bringing fresh, uncooked, unsalted joints of mutton and beef from the ends of the world, from Australia and South America, to be sold in this country at a reasonable price, it would be foolish to manufacture the extract, except for the use of invalids, and as the beefy element of soups, handy and ever ready for use; but at present we are merely groping after such a method, and trying experiments; and therefore it is very desirable that we should at present continue to import such parts of the beef of South America and Australia as can be reduced into this highly portable and almost imperishable form, more especially as by the addition of eggs, or vegetable equivalents, we can supply efficient substitutes for those parts which at present we have no certain means of bringing from distant lands.

It must be admitted that the probability of large and ever increasing importations of meat from the colonies and foreign countries presents a serious lookout for the British farmer; but he will do well to consider whether there may not be some streaks of brightness in the horizon.

In the first place it is clear from indisputable evidence that great numbers of the people of this country are at present insufficiently fed. A very large part of the population of towns, and a considerable part of the population of rural districts, are shown by good medical witnesses to be undergoing a steady course of physical degeneration from this cause. Nor is physical degeneracy ever unaccompanied by intellectual and moral degeneracy. While, therefore, the tendency of the labour market is constantly towards a rise of wages, and the farmers in some districts are the objects of obloquy, because they do not pay higher wages, the value which they receive for their payments has in some counties no corresponding tendency to rise; and the labour available in the lowest waged districts is scarcely worth the low wages that are paid. The farmer, therefore, of all men, has the greatest interest in the improvement of the physical, moral, and intellectual condition of the farm labourer. It is far better for all of us to pay a good price for a good article than a low price for a bad article.

It may be taken as certain that the home supplies of animal food must be supplemented from beyond seas. It is useless to say that, *if* the condition of things, and the public opinion in

this country, were quite different from what we know them to be; *if* land, for example, were regarded simply as designed to provide food for all men, and labour for as many men as possible; *if* the poorer classes were stronger, more industrious, and better educated than they are; and *if* all the operations of agriculture, as regards crops and stock, were regulated by the highest science, without any waste, the land of the United Kingdom might produce much larger supplies of food than it now produces. Of course it might. But what chance is there of the realisation of these "ifs"? There is no chance that within any conceivable period the land of the United Kingdom will cease to be regarded in the old light, as more valuable for the social and political importance which it confers, when accumulated in large quantities, than for the actual money produce of the acres; and it is certain that, on this side of the Millennium at any rate, we shall have to draw largely on distant countries for our supplies. We are beginning to see whence or how they will come.

The first importations from any country are generally at a lower price than can be ultimately maintained. The beef of Australia and South America are at present at the lowest rate in those countries because there has been little or no market for them there. But establish a good market with a ready sale for them here, and by creating a value for them there you tend immediately to raise their price. The first large consignments of American cheese were offered in this country at a figure exceptionally low, because the American war had destroyed the American market for cheese, and that article had no standing here: but as soon as the American cheese got hold of the English markets, the price rose in America; American cheese was no longer an unsaleable drug, and when the war ceased the prices in the two countries were much more nearly equalised. So it will be with meat. The first prices of beef and mutton from Australia and South America, being unnaturally low, will be raised when the market for them has been thoroughly established here and elsewhere.

On the other hand, it seems very improbable that distant lands will be able to send us any meat good enough to compete on equal terms with the best of our own meat. Let the British farmer take care to produce the very best beef and the very best mutton, and the wealthier classes in this country will never cease to be his customers, while he may even look to becoming an exporter of the best joints to the more luxurious feeders of Paris, Brussels, and Vienna. At a dinner given in London last summer, a haunch of venison, which had been killed nine weeks previously, and preserved by hanging in a frame, round which cloths dipped in bisulphate of lime, on Dr. Medlock's plan, had been stretched without actually touching the meat, was pronounced to be excel-

lent, quite fresh, and free from taint. Two foreign gentlemen who were among the guests said, "You are pleased because you think that by this means you can bring meat for your working classes from Australia; we see also that, when we give a dinner in Paris, we can have a good joint of beef or mutton from England." The farmer will not lose the ordinary farm labourer and others of the poorer classes as his customers for meat, for they are not now his customers. Their hungry stomachs are unacquainted with good English beef and mutton; and, if they can be filled with the produce of Australia and America, so much the better for them; and for him, too, for he will gain by their better health and strength, and by a consequent diminution of his poor-rates.

Metropolitan Markets.—It is well worthy of consideration whether, by a better organisation, the producer of meat might not receive a larger share than he now receives of the proceeds of the sale of his beef and mutton. The difference between the price which he obtains for his live meat, and the price which the consumer pays to the retail butcher for his joints, appears to be greater than the necessities of the case require. Almost every butcher in London is an advocate for a single live-meat market and a single dead-meat market, in close contiguity: and it is admitted that such arrangements are convenient for the London butchers. It is also admitted that any arrangements which are really inconvenient for the butchers must have a reflex effect on their customers: but there is another side to this picture. The butcher is not the ultimate producer. What about the interests and convenience of the producers of stock, the landowners, and the farmers? Is their convenience, are their interests, on all fours with those of the butchers? Possibly not: and, if not, may not those arrangements for a single Metropolitan Market, which every butcher prefers, because they give him the command of the situation, be calculated to place the producers, the sellers of stock, at a corresponding disadvantage, throwing upon them the whole of the risks and losses which arise from ignorance of the state of the markets on any particular day, and enabling the London salesmen and the London butchers to engross the gains which depend on a knowledge of its state. It is true that the landowners and farmers are scattered all over the country, while the salesmen and butchers of London might be covered with a handkerchief; but could not the former combine, and act in bodies, instead of being utterly isolated, so as to maintain their own interests rather better than they are maintained at present?

In this point of view, as well as in many others, the subject of markets is of serious importance to the farmer. It is still

under consideration at the Society of Arts, and will shortly be fully discussed there in a paper to be read by Mr. J. C. Morton, who is making the necessary collection of facts.

The Royal Agricultural Society would probably co-operate with the Society of Arts in dealing with the important question of food markets.

Suggestions have been made for the establishment of additional markets in connexion with the principal railway stations in London. The metropolitan salesmen and butchers are entirely averse to such suggestions. How do they strike the agricultural interest?

How far is it desirable for the producers of stock that the sale of dead meat should be substituted for the sale of live meat?

There can be no doubt that under present arrangements the transit of live meat by the railways is damaging to the condition and value of the animals. Cannot the Royal Agricultural Society, its affiliated societies—the Chambers of Agriculture, and the Farmers' Clubs—combine to procure an improvement of such arrangements? That which the individual farmer is powerless to obtain from a railway company might very easily be secured by a little combination among the powerful bodies that are established for the express purpose of promoting the interests of Agriculture.

Meat Trucks.—The quantity of dead meat now sent to London from the country is great: but the arrangements for conveying it are barbarous. The meat is exposed to unnecessary injury. Why should not agriculturists combine to insist on the adoption of suitable meat vans, in which the meat might not be pressed, nor piled up, nor handled, nor exposed to dust, heat, and wind,—well ventilated meat vans, kept at a moderate temperature, and fitted with portable larders where the joints might be placed by the farmer or country butcher, and which might be lifted into the London kitchen, or butcher's shop, without handling the meat at all?

Is it impossible to adapt the principle of "co-operative" action to the case of the producers of meat? With new arrangements, or even with the present arrangements of markets in London, could not meat be sent on the co-operative principle, directly from a given number of farms to a London butcher, or to an agent of the farmers, who would divide with the farmers the actual profits, instead of leaving them to be carried off by the other parties? Why should there be any intermediate agency at all between the farmer who kills his own meat, and the large consumer who buys it, in the club, the hotel, the large private house?

Before we pass from this subject it may be well to suggest for consideration whether the farmer should not usually undertake on his own farm the slaughtering of his beasts and sheep. It is clearly of great importance to the goodness of the meat, and to its preservation from rapid putrefaction, that the animal should be killed in a quiet state. All travelling by rail or by road is injurious to a fat animal; and one does not see, *primâ facie*, any reason why a bullock or a sheep should not be slaughtered on the farm where it has been brought to perfection, as well as a fatted hog.

The subject of milk is highly important in many ways.

Milk.—The transit of milk by railways demands immediate attention and improvement. It is almost as bad as possible. They manage these things better in France. The milk-can which is used on the French railways, and may be seen at the house of the Society of Arts, is not nearly so large and heavy as the lumbering can, appropriately called the "churn," which is used on our English lines. A man can easily lift the French can; it is filled full of milk, and is so stoppered down that there is no room for the least motion to churn the milk and separate its buttery particles. The can in hot weather is covered with a textile wrapper, which is watered with a fine rose before the train starts; and in a long journey the watering is repeated at intervals. There are special milk-vans, in which the cans are arranged in tiers: and the effect of the whole system is that the milk is carried without deterioration. This cannot now be said to be the case in England: a very short journey on an English line damages the milk and lowers its price; but a little combination among the producers of milk in any dairy district would be sufficient to compel the railway companies to improve their arrangements.

The subject is extremely important, because milk, being a very perishable article, is one in which the home farmer has great advantages over the foreigner, and because all the medical authorities agree that, with rare exceptions, the supply of milk is very inadequate to the real requirements of the people of England, and especially of the children of England, whose health and strength cannot be maintained at their proper standard without a much larger allowance of milk than they now obtain. It does not appear that the milk sold to the rich in London is much diluted after leaving the cow; but in the sale of cream a gross fraud is habitually practised. The cream-measures are commonly about 25 per cent. below their nominal capacity, so that the purchaser of six pennyworth of cream is commonly cheated out of at least three-halfpence. When we come to the sale of milk to the poor, in low neighbourhoods, we find that the grossest frauds are

perpetrated. The so-called "milk" is so diluted, that it is scarcely worthy of the name. The price for this substitute is the same as that which the rich customer pays for real milk; and, under these circumstances, it is no matter of wonder that the poor of London are not fond of milk, nor very large customers of the milkman.

Assuming the "barn gallon," by which the dairy farmer sells his milk, to be equal to two imperial gallons—though, in some places, the custom is to give 17 pints to the "barn gallon"—it will be seen that there is a very wide difference indeed, between the wholesale price at the farm and the retail price in London. The latter is never less than 4d. the imperial quart, which is at the rate of not less than 2*s*. 8*d*. the barn gallon, without taking into account any dilution of the milk by water.

The proportion of water to milk can be easily determined by a common lactometer, a simple instrument which costs a shilling, and can be understood by a child. It is merely a small tube of glass, like a thermometer, with a bulb at the lower end. In this bulb is a little quicksilver, or other material, which is of the right weight, when placed in a bowl of milk, to sink the tube to the exact level of the "good milk" line. The police, or special inspectors of milk, ought to be empowered in London, as in France and Belgium, to test by such an instrument any milk on sale, in a dairy or in the streets, and to seize and take before a magistrate any sample found to be diluted; and the magistrate ought to be empowered to inflict heavy and cumulative penalties upon all offenders. The farmer has a real and urgent interest in the prevention of frauds in the sale of an article which he produces.*

The manipulation of milk, with a view to its keeping, is but little practised in England. The practice of "clotting," which is common in the West of England, is scarcely known elsewhere; but it seems well worth while to consider whether it might not be extended with advantage. The importance of milk as an article of nutriment can scarcely be overstated in the interest of the public; and the interest of the farmer appears to be as deeply involved in the adoption of some process by which the milk which he produces can be conveyed to a ready market, where it would fetch a high price, in a condition much less perishable than its natural condition, equally palatable and nutritious as

* As the specific gravity of cream, as well as of water, is less than that of milk, it has been suggested that the lactometer might lead an observer to mistake an abundance of cream for the presence of water: but this is a mistake which may be possible in theory but is scarcely possible in practice. The instrument used by the French police costs about 2 francs in Paris. The writer bought an equally good lactometer for 1s. at Messrs. Phillips, 180, Bishopsgate Street Without, E.C.

natural milk, and without the use of expensive machinery or intricate manipulations.

Before passing from the subject of milk, it is necessary to say a few words respecting the Anglo-Swiss condensed milk which is now prepared at Zug, near Zurich, in Switzerland, and imported into this country by the "Anglo-Swiss Condensed Milk Company," whose office is at 95, Leadenhall Street, London, E.C. This preparation, which may be obtained at any large grocer's, now enters into competition with English milk to a limited extent, but is likely to become important. It is nothing but sugared milk from which the water has been evaporated, in vacuo, until the consistency of honey has been obtained. The addition of water restores the article to the character, appearance, taste, and properties of sugared milk. The sugar is necessary to preserve the milk. This preparation is likely to supersede all other contrivances for preserving milk for use on board ship, and in other situations where fresh milk is unattainable. It comes from Switzerland in small tins hermetically sealed. One can scarcely assign any limit to the time during which the milk will keep good in the unopened tins; and, even when a tin has been opened, the contents will keep good for a long while, so that they may be used in very small quantities, day after day, till all is consumed. This preparation is, therefore, well suited for sick and poor rooms where fresh milk rapidly spoils, and, though the price is rather higher than that at which milk, so called, is nominally sold in London, this condensed milk is really milk and sugar; and, taking into account the excellent quality of the milk, it is really cheaper than the miserable article which the poor in London are commonly supplied with. The invention does not appear to be patented, and therefore it is open to the enterprise of any English farmer or dairyman. It is well worthy of attention in Ireland.

Cheese.—The factory system by which, as the readers of this Journal are aware, a large part of the cheese which is imported from America is produced, is employed in the condensation of the milk at Zug. How far this system will answer in England remains to be proved; the experiment is of the highest importance to English agriculture; and the results to be obtained by the cheese factories, recently established in Wiltshire, will be looked for with lively interest.

The same questions which have been suggested with regard to the shares of profit in the case of meat may be raised in reference to cheese. The writer of this article recently received, from a dairy in Cheshire, a cheese, weighing 54 lbs., which, including carriage to his house in London and all other charges, cost him a fraction over 7¼*d.* a lb. For cheese of the same

character, which was excellent, he was paying his West-end cheesemonger 13*d.* the lb. Can the dairy-farmer make no co-operative arrangement by which he could obtain a share of the difference between 7½*d.* and 13*d.* per lb.? Cheese, however, being one of the least perishable forms of milk, is on that account, and perhaps on other grounds, a form in which the home producer is at the least advantage in competing with the distant producer; and, looking at the matter with a view to the interest rather of the consumer than of the producer of cheese, one would bid the farmer bethink himself first of milk, then of butter, and lastly of cheese. He must, however, look after his own interests rather than those of the public, though his and their interests will generally coincide.

Butter.—The factory system might well be applied to the making of butter as well as cheese; but in many parts of England butter-making is at a low ebb. The Agricultural Societies and Farmers' Clubs in the midland, home, and southern counties would do well to turn their attention to the importance of encouraging this art. The altered habits of society withdraw the wives and daughters of the farmer from the manual operations of the dairy, and devolve them upon servants who are too often ignorant and careless: and it not uncommonly happens that families, living in the country, who require good butter, and are ready to pay for it, being unable to procure it in their own neighbourhood, are compelled to get it from London: this has happened in more than one county to the writer. If at the Agricultural and Horticultural Shows prizes were offered for the best butter, the art would soon be recovered, good dairymaids would cease to be rare, and our home produce might again compete more successfully with the butters of Holland, France, and the north of Europe.

Cooking.—On the subject of "Cooking," the Food Committee of the Society of Arts has not as yet put forth any definite conclusions; but it has called attention to two important contrivances. One is Captain Warren's economical apparatus, which appears to possess great merits, economising fuel and preventing the enormous waste which occurs when meat is cooked by the ordinary methods of roasting, baking, or boiling; and the other is the Norwegian apparatus, which attracted great attention in Paris at the Exhibition of last year.

Capt. Warren's complete apparatus for cooking with the greatest possible economy for large numbers of persons cannot well be described here; but his "Cooker," which is simply an improved saucepan, varying in price according to the size, from 9*s.* 6*d.* to 27*s.*, ought to be used in every house. Wherever water can be boiled, and kept boiling, there this saucepan may

be used. The food in them is cooked, in its own vapour, by the heat of steam, but without any contact with the steam or with water, so that there is scarcely any waste, and no dilution; and as the steam, which circulates beneath the cooker and between its inner and outer skins, cannot exceed 212°, and consequently the temperature in the cooker cannot exceed 210°, the fibre of the meat thus cooked cannot be hardened by excessive heat, but remains, or is rendered, tender and digestible in the highest degree. The great importance of cooking at a moderate temperature is overlooked in this country, but well understood in France, which is eminently the cooking country. The French cook dresses her meat very slowly with a very small fire; the English cook, making the largest possible fire, spoils, as well as wastes her meat, by excessive heat. One of the greatest merits of Captain Warren's cooker is that it is *impossible* to cook the meat too quickly and hotly in it; and though this great merit would be a demerit in the eyes of a bad cook, the "Cooker" saves her so much trouble, and is so easy to use, that she soon becomes enamoured of it. Messrs. Adams, the well-known ironmongers in the Haymarket, No. 57, are Captain Warren's agents for the manufacture and sale of his inventions; but probably they may be procured through any ironmonger.

The following are the results of an experiment tried by the Food Committee at the Society of Arts:—Three legs of mutton were cooked, two of them from the same sheep. No. 1, which was "Warrenised," *i.e.* cooked in Captain Warren's patent cooker, weighed 9 lbs. 11 oz. before it was cooked, and 9 lb. 6 oz. when done. No. 2, which was boiled in water, weighed 9 lbs. 13 ozs. when it was put in, and 7 lbs. 8 ozs. when taken out. No. 3, which was roasted in an oven, weighed 8 lbs. 14 ozs. when put in, and only 5 lbs. 12 ozs. when taken out. The verdict of the Committee was unanimous in favour of the superior flavour and juicy condition of the Warrenised leg No. 1; its advantage over the other in respect of waste is apparent. Some bacon "Warrenised" on the same occasion was very highly approved, as were also a turbot, some chickens and vegetables of various kinds. The cooker is used daily in the writer's house.

The Norwegian apparatus is simple enough, and very cheap. The peasants of Norway, wise in their generation, are great eaters of porridge. They found that by boiling their mess for only five minutes, and then immediately enclosing the saucepan, all hot, in a little felted box, the heat acquired in boiling was sufficient to complete the cooking of the porridge and to keep it hot for many hours. The accumulated heat, instead of passing off rapidly by radiation, which would have happened if the

saucepan had not been enclosed in a non-conducting substance, was retained by the felted covering, and completed the cooking without any further application of fire. The Norwegian Government, taking a leaf out of the peasants' book, adopted the practice in the Norwegian navy, where it has proved successful for the last three years; and, with this prestige in its favour, the apparatus was exhibited, and repeatedly tested, in Paris during the last summer. At the close of the French Exhibition the Society of Arts invited the patentees, Messrs. Sorensen and Plahte, of No. 13, Duke Street, Grosvenor Square, to exhibit their apparatus and to allow it to be tested by the Food Committee, and the Society's Journal reports that, on the 9th of November, 1867, those two gentlemen attended the Committee, and submitted their apparatus to trial. "A leg of mutton, with vegetables, was placed in the stewpan, boiled for five minutes, and then carefully enclosed in the [felted] box, and the lid sealed. When opened, at the expiration of $3\frac{1}{4}$ hours, the whole was found to be perfectly cooked; the temperature of the water being then about 160° Fahrenheit." Several further trials were subsequently had, and the Norwegian principle may be declared to be established.

In connexion with this plan one further remark will suffice here. In every farm, in every cottage, a fire is lighted and a kettle boiled in the early morning. On that fire let a saucepan, or saucepans, containing the provision for the midday dinner be placed to boil for only five minutes, and then be shut down, all hot, in a common deal box well fitted with cheap felt; and the good man of the house, with the good woman and the children, need concern themselves no more about the matter until the time for dinner shall arrive. At that time the food will be found to have cooked itself, as it were, by its own heat, and will be piping hot. The labourer may carry his dinner, in a little box, to the fields, and while he is working the dinner will be cooking, and he will have the benefit of a hot dinner, instead of a cold meal, when the hour is come. The superior force and power of work which the labourer would derive from eating hot instead of cold food cannot well be arithmetically stated, though it is known by experience to be very great. It is probable that the course of events may tend to make it the interest of the farmer to concern himself more and more in the actual feeding of his labourers.

At present if a farmer is alarmed at the constantly increasing demand for the better education of the agricultural poor, it can scarcely be said with justice that he has no reasonable ground for such alarm. He finds by experience that education at present tends to withdraw workmen from his land, and he

scarcely sees that this is not a necessary and natural result, but is due to certain defective arrangements which he has it in his power in great measure to amend. Now, as soon as you give a tolerable education to the child of an agricultural labourer, his aim is to cease to be agricultural; he turns his attention to something which he thinks (not always in wisdom) more attractive than working in the fields: to be an errand boy, a deputy assistant porter's boy in the shop of the village or town, appears to him to open a grand vista of future employment, and his father and mother are desirous to give him a chance. So away he goes, perhaps to success, perhaps to ruin; but, at any rate, he is lost to agriculture. Is there anything at present in the character of our schools in agricultural parishes which is calculated to counteract this tendency to fly off from field-work? Nothing whatever. But something might be done if landlords and farmers were to place themselves in the same sort of relation to rural schools that many manufacturers have assumed towards town schools. The manufacturers who employ many hands have schools of their own connected with their works; they take care not only that the children are educated, but that education is carried on for the elder children and adults after the hours of labour. They connect the schools and the works, from first to last, in the minds of both parents and children. Good progress in the schools is made the passport to employment; and the better the school the greater and more certain is the succession of well qualified candidates for employment. A similar system, combining education with employment, is successfully carried out on the estates of a well-known nobleman in one of the home counties. He makes attendance of the boys and lads at school—the boys at his day school, the lads at his evening school—a condition not only of their own employment, but of the employment of the fathers on his estate; and by fines and otherwise he punishes all truants.

It seems perfectly certain that, before many more years have passed away, the law will require that every child under a certain age throughout the United Kingdom shall receive education during a certain minimum number of hours in each year; and there may be a few persons who will unthinkingly exclaim, "If that be so, then agriculture is ruined." The ruin of manufactures was in like manner predicted when first the Factory Acts connected compulsory education with factory employment; but manufactures have not perished, nor are they likely to perish: nor will agriculture be ruined by similar means. The difficulty is greater in the case of agriculture, because the half-time system is not so applicable there as it is to manufactories; but on large farms, or where two or three contiguous farms might com-

bine, the education of the children of the agricultural labourers might, with better arrangements, be carried on, not at the sole expense, but under the influence and control of their employers, in the spirit of a "work-school," with a direct view to the education of future agricultural labours, and with an express connexion between their school progress and their farm employment, so that a lad and his parents would look forward to his employment on the farm as his natural destiny, as a result of his good conduct and progress in the school, as naturally and confidently as at present the lad in the works-school looks forward to employment in the factory. Such an improved state of things would be greatly facilitated in those cases where the employers could conveniently provide board and lodging for the lads, under suitable superintendence, on the farms. By good arrangements they could be well fed at a very low cost, and every medical man will testify that without sufficient food in childhood it is impossible to arrive at a healthy manhood. There is only one kind of economy which is worse than that of allowing the land or the stock to starve, and that worst kind of all is to allow those to be insufficiently fed in childhood who are to work for your wages when they grow up, and whom you must maintain on your poor-rates when they are no longer able to work.

VIII.—*On Land Drainage and Improvement by Loans from Government or Public Companies.* By J. Bailey Denton, Mem. Inst. C.E., F.G.S.

Prize Essay.

1. In the year 1840 the late Mr. Philip Pusey succeeded in passing through Parliament his Act (3 & 4 Vict. c. LV.) "to enable the owners of settled estates to defray the expenses of draining the same by way of mortgage." By that Act owners for life could only borrow money on the security of their estates with the approval of the Court of Chancery.

The very mention of the Court of Chancery will at once explain how it was that no appreciable result followed the passing of the Act—only eleven applications having been made. The expense as well as the tedious nature of Chancery proceedings, which were fairly represented before the late Duke of Richmond's Committee in the House of Lords, in 1845,* acted as a veto. One great principle, however, was established by Mr. Pusey's Act, viz., that owners of settled estates might

* See Appendix to the Evidence taken before the Committee.

charge them for a certain number of years with the cost of durable improvements, though the owners creating the charge might not live to see the borrowed money repaid.

In that Act the period fixed for the repayment of the principal money was not less than eight years nor more than eighteen years, and the care with which the Legislature protected the reversionary interests will be apparent from the provisions which the Act contained, and which have been adopted in subsequent Acts, to the effect that if the instalments were not paid up, the land upon change of possession should not be liable to more than half-a-year's arrear of instalment.

2. Between the years 1840 and 1844, the public advocacy of under-drainage by the late Mr. Smith of Deanston, and the valuable Essays of Mr. Josiah Parkes, in the 'Journal' of this Society, having served to popularise under-drainage as a fundamental branch of agriculture, the attention of the landed interest was drawn to the necessity of further facilitating the application of borrowed money to drainage and other durable land improvements, and of charging the improved lands with the repayment.

The first effort made to apply collective capital to the improvement of landed property was that made in the year 1843, by the Yorkshire Land Drainage Company, of which Mr. J. H. Charnock, of Wakefield, was the originator, and in which the late Lord Carlisle, Lord Zetland, Mr. Godfrey Wentworth, Mr. Henry Briggs, Mr. Hammerton, and Messrs. Bradley of Richmond, in Yorkshire, with the late Mr. James Smith of Deanston and the present writer, took active interest as Directors. This Company, however, did not succeed in establishing itself, owing to the difficulties started by mortgagees and other claimants having interest in entailed estates, which it was the object of the Company to improve, but it did great service in originating a Bill for the extension of legislative powers, which Mr. Pusey in the session of 1844 undertook to conduct through the House of Commons.

This Bill was intended to secure a more direct and less costly means of proceeding than that laid down by the Act of the 3 & 4 Vict., and to obtain for drainage loans priority over existing mortgages, on the ground that as no loan for that purpose could be legally sanctioned, unless it could be satisfactorily shown that the return from the improvement would exceed in annual value the rent-charge by which the cost would be repaid, the security of existing mortgages was enhanced and not diminished.

It is very pleasing to trace the great interest taken in this important question by the late Mr. Pusey, to whom agriculturists, and this Society especially, owe so much. On the 7th of

January, 1844, he wrote to the writer thus:—"The question of amending my Act has certainly now become more practicable, as well by the formation of the Yorkshire Society as by the lapse of time, and by your having obtained from Mr. Bellenden Ker positive suggestions on the subject. All these suggestions, as far as I understand them, appear to me improvements, and *I should even be disposed to try priority for such charges over existing mortgages.*"

The Bill referred to, having been handed to Mr. Pusey, was conducted by him through several stages in the Commons, but was dropped, partly in consequence of the grave doubts expressed by the Solicitor-General (the present Lord Chancellor *) as to the justice of giving the rent-charges to be created under the Act the priority which was sought, and partly because an understanding was come to that the late Duke of Richmond should introduce the measure in the House of Lords, in the ensuing session of 1845,† when the objection raised by the Solicitor-General should be more fully considered. It will be remembered that the noble Duke referred to succeeded in obtaining a Committee to take evidence, and to report upon the proposed measure, early in the spring of 1845, and that he introduced his Bill in the following June in accordance with the understanding come to with Mr. Pusey. This measure, to alter and amend the Act of the 3rd and 4th of Victoria, became a law in the same session (8 and 9 Vic. cap. LVI.). In the meantime the Government had undertaken to take the matter up on an enlarged basis.

3. It was at this juncture that the Prime Minister, the late Sir Robert Peel, considered it due to the agricultural interest that an advance of public money should be made for the drainage of land, in order that the owners of settled estates might be the

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* Lord Chancellor Chelmsford.

† The following copy of a letter, written by the late Mr. Pusey to the writer will be read with interest:—

"Dear Sir, "Pusey, August 3, 1844.

"I am sorry that as the Solicitor-General disapproved of your Bill, it becomes hopeless to carry it beyond a second reading. I doubt if we can gain the point of priority. If the parties whom you represent think it desirable to proceed, your best course would be to draw up a statement of existing difficulties and the proposed remedies. The Duke of Richmond has expressed his readiness to assist us, and I would communicate your representation to him. Possibly, as it relates to proceedings in Chancery, it would be best that the Bill should be originated in the House of Lords, where there are so many who have been at the head of that court.

"January next, however, will be soon enough for you to put me in possession of your views.

"Yours very truly,

"J. Bailey Denton, Esq." "Philip Pusey.

better able to meet any depreciating effects which might follow the repeal of the Corn Laws.

"The Public Money Drainage Act," (9 and 10 Vic. cap. CI.) was the result of this concession, and several great advantages were gained by it in furtherance of the principle established by Mr. Pusey's Act.

These advantages were, first, the removal of the proceedings out of the hands of the Master in Chancery (in which they were still left by the 8th and 9th Vic. cap. LVI)., into those of the Inclosure Commissioners; next, the precedence given to improvement charges over existing mortgages,—and last, the foundation of a system of drainage which, though open to some objections, has, on the whole, acted wholesomely and beneficially for the advancement of agriculture.

Two millions of money was the first grant under the "Public Money Drainage Act," and the applications were so numerous and so rapidly made, that the whole of that sum was quickly bespoke. A second loan of two millions was afterwards granted (13 and 14 Vic. cap. XXXI.), and although up to this time (Feb. 1867) the whole of that money has not been actually spent, none remained unapplied for at the end of the year 1854. The applications for it, indeed, were so large and numerous that the Commissioners were very soon compelled to refuse loans to landowners in those counties where the applications had been larger than in others, and they were ultimately obliged to defer applications altogether, even in those counties where they had been comparatively few.

The amount of money actually expended under the Public Money Drainage Act up to the end of last year (1866) was 3,869,142*l.*, leaving 130,858*l.* still to make up the two grants amounting to 4,000,000*l.*

The rate of progress at which the public money has been expended will be seen from various published essays.* Up to the end of October 1855 the expenditure had been 2,528,783*l.* 19*s.* 7*d.*, and up to the same date in 1861 it had amounted to 3,520,258*l.* These figures, compared with the expenditure up to the present date, show that in the first eight years the expenditure was, on an average, about 316,000*l.* a year; in the next six years about 165,000*l.*; and in the last five years about 70,000*l.* a year.

These differences are explained by the circumstances that the Inclosure Commissioners were, as stated, very early obliged to decline or defer further applications for loans, and that private enterprise, in the shape of improvement companies, had stepped

* See "Land Drainage and Drainage Systems," Ridgway, London; and "Journal of Society of Arts," Dec. 14th, 1855.

in, to supply money to landowners from sources more generally approved by the nation than the public exchequer.

4. While capitalists were busy in the establishment of private companies as a medium of supplying money for land improvements, a general Act was passed, called "The Private Money Drainage Act, 1849," (12 and 16 Vic. cap. C.)* the object of which was to promote the application of private money to the same purposes and upon the same principles and machinery of action as had operated in the Public Money Act.

The term of years for which landowners could charge their estates for the repayment of loans was the same under both Acts, namely twenty-two years; but the great boon conceded by the use of the public money at a low rate of interest became manifest directly an effort was made to effect a private loan for that period of years.

In Clause XXXIV. of the Public Money Act it was enacted that the land improved should be charged "with the payment to her Majesty in respect of such advance of a rent-charge after the rate of 6*l.* 10*s.* rent for every 100*l.* of such advance."

In Clause IX. of the Private Money Act it was enacted that the Inclosure Commissioners should issue a grant of rent-charge "to be payable by half-yearly payments for and during the term of twenty-two years," leaving the landowner to arrange with any capitalist lending the money the rate of interest he should pay for the same not exceeding 5 per cent., which under Clause IV. of the Act was the utmost rate of interest the Inclosure Commissioners could sanction.

It was soon found that private capitalists could not advance money at the same rate of interest,—viz. $3\frac{1}{3}$ per cent.,—as the Government were able to do, and, that as the rate of interest they demanded corresponded with the fluctuating value of money in the open market, the annual instalment exceeded the amount tenants were prepared to pay for drainage. This will be seen when it is pointed out that the annual instalment to repay 100*l.* with interest at $4\frac{1}{2}$ per cent. was 7*l.* 5*s.*, and at 5 per cent. 7*l.* 10*s.*, instead of 6*l.* 10*s.* with which the Government were satisfied.

This, however, was not the only reason why little was done under "The Private Money Drainage Act, 1849." Capitalists generally objected to advance money repayable by instalments on the ground that they were unable to reinvest without loss the portions of principal money when repaid, and that where the

* This Act has since been repealed by the Improvement of Land Act, 1864.

half-yearly payments were small the arrangement altogether ceased to be mutually advantageous.

That the Act did not realise the expectations of the authorities by whom it was promoted may be inferred from the fact that, up to this moment, the total sum expended under its provisions is 269,579*l.* 5*s.* 7*d.*; while if we go back to the end of October, 1855, the sum expended was 128,723*l.*, and to the same period in 1861, 234,800*l.*

5. It was to supply the place of the "Public Money Drainage Act" that the various companies were established under their special Acts of Parliament, by which they were enabled to transfer the rent-charges created under their Acts in such aggregate amounts as would be acceptable to capitalists and corporate institutions whose arrangements admitted of their dealing with them. By this power they severally gained the command of unlimited capital. But as an object of primary importance they sought and obtained an extension of the period for the repayment of the money advanced to landowners.

6. As upon this latter point considerable difference of opinion prevails, it may be desirable to explain the relative advantages and disadvantages of short and long periods of repayment.

As a fundamental rule, it may be stated that, in proportion to the durability of the improvement of property, so may be the length of term over which the repayment of its cost may extend. This rule is based on the same principles as apply to the purchase of different characters of property. If land, which is imperishable, is purchased, thirty years' purchase is given for it; if houses, which are perishable, there is hesitation in giving for them as much as twenty years' purchase.

On a general view the advantages of a short term for repayment over a long one are so obvious that it is hardly necessary to state them. The property improved becomes year by year more and more valuable, while there is a greater chance of the promoter of the improvement outliving the rent-charge, and leaving the property free to his successor. A tenant for life, too, is sooner relieved from his responsibilities as to maintenance, and all parties connected with the works—those who were responsible for their execution as well as those who have been benefited by them—are the sooner relieved from the risks and objections which must occasionally arise from accidents and defects. But as it follows, necessarily, that the shorter the term the higher the amount of instalment, it often happens that these advantages are purchased at a sacrifice of present income.

The advantages of a lengthened term over a short one are not so readily stated, though they all merge into the one important question of whether the tenantry can afford to pay the annual charge for repayment. There are a great many estates requiring improvement, probably a majority, which are under disability of entail or settlement, or are held by clergymen and others for life, who are unable to provide money for improvements and cannot afford to suffer any diminution of income. Such owners will not voluntarily concur in any proceeding involving them in the payment of an annuity larger than they can gain from their tenants in the shape of increased rents. It is in such cases that a lengthened term tells with great advantage, inasmuch as money borrowed for and repaid within the different periods authorised by the several Acts if reduced to figures results in the following annual charges (when money is to be obtained at $4\frac{1}{2}$ per cent):—

	£.	s.	d.	
22 years	7	5	0	per cent.
25 „	6	14	0	„
31 „	6	0	0	„
50 „	5	0	0	„

Some few of the more wealthy landowners, who apply their own money to improvements, are content with even a less return than the lowest of these rates; and as long as the works are as durable as well-executed drainage, 4 *per cent. in the improvement* of freehold land is a more profitable return for money expended than 3 *per cent. in the purchase* of additional land.

But this view of the case does not apply to landowners who have not spare money at command, or having capital desire to employ it in other ways, though willing to improve their property for the benefit of their successors as well as themselves and tenants.

To such persons the questions which first present themselves are—upon what terms can money be borrowed and repaid by instalments? and what annual charge or increase of rent is it right to put on the land for the required improvements?

The first question will be answered by the figures just given; and with respect to the second, it is pretty generally admitted that, although some lands will bear a much greater charge than others, an increase of rent varying from 5 to 10 per cent. on the outlay is what may fairly be expected from drainage improvements. Something between 6 and 7 per cent. will represent the average rate of increased rent which has been charged.

In other improvements there are many questions of a special nature involved which do not allow of such an easy treatment. In the erecting of new farm buildings, for instance, the consider-

ation due to repairs and maintenance—the cost of which new buildings reduce,—the effect of the improved accommodation on the renting value of the whole farm, the influence of good buildings in securing men of capital as tenants, and a variety of other points, all present themselves with varying force according to circumstances; and exactly in proportion as the benefit is immediate or remote, direct or indirect, so will the greater or less length of term for the repayment of the cost have weight.

In the building of cottages—an object increasing in importance every day—the question assumes a different aspect. Cottages pay worse than any other kind of estate improvement. Good dwellings for the labouring classes, nevertheless, are indirectly as beneficial to the owner and farm tenant as to the cottager, and it is the opinion of those who would encourage cottage-building that the term for repayment should be lengthened as much as the law will permit, in order that the proportion of the annual instalment to repay the cost may be reduced as much as possible.

One of the advantages from extending the term for repayment most strenuously advanced by its advocates is that tenants generally, and very naturally, look more to what they have to pay as an increase of rent than to the durability of the work for which they are to be charged. A tenant, for instance, who desires to have his lands drained or his buildings made good, expresses the wish to his landlord; and the first point discussed between them is whether or not the tenant will pay the annual instalment by which the outlay may be repaid. "That," answers the tenant, "will depend upon what money will be expended and what amount of instalment will be charged," and the too frequent result of the conference is that the work is limited to the present views of the tenant without due respect to the future and permanent interests of the landlord. If the tenant determines, for instance, that he can only afford to pay, for what he wants, a given sum of money—say 60*l.* a year —the negotiation assumes a simple arithmetical character. Supposing the period of repayment to be limited to twenty-two years, and the annual instalment is 7*l.* 5*s.* per cent. (calculated at 4½ per cent. interest), all that could be spent would be 826*l.* 10*s.*; whereas if the period be extended to thirty-one years the amount that may be expended without any increase of the annual instalment will be 990*l.*, a difference which, it may fairly be said, will more than pay the extra cost of required durability. The consideration due to this view of the case becomes very obvious when it is remembered that the Inclosure Commissioners, acting as protectors of the reversionary interests, will not sanction the execution of any drainage nor the erection of any buildings which are not of a substantial character, whereby the cost of such works is frequently raised

beyond what the tenant, looking to his own interests only, would desire.

In thus recording the views that prevail with many that have carefully considered the subject, it is right that we should resist to the utmost the evils that may arise from the extension of the term for repayment beyond a reasonable period, and before describing the powers of the several companies it may be well to state that the privilege of charging for an *unlimited* period has met with almost universal objection.

As if to run from one extreme to another, the first Drainage Company's Act (the West of England Company's Act) obtained after the passing of the Public and Private Money Drainage Acts—which, as before stated, limited the period for repayment to twenty-two years—contained provisions enabling landowners to charge their estates in perpetuity,* *i.e.* to borrow money and charge their estates with the cost without the obligation of liquidating the principal. It is against this power, which is liable to much abuse, that the greatest objection has been raised.

The next private Act obtained was that of the General Land Drainage and Improvement Company, 1849, by which powers were given to charge the cost of the more permanent improvements, such as drainage, clearing, and inclosing land for the term of fifty years, and for the erection of farmhouses and farm buildings for the term of thirty-one years. The fifty years' term, however, has been but seldom adopted, and it may be here stated that not only do the Inclosure Commissioners, the principal Companies, including the General Land Drainage Company itself, and the capitalists advancing the money, prefer a shorter period, but that the majority of the landowners partake in the same feeling, though it is obvious alike to all, that a few years' extension may often operate favourably in securing better and more durable work, and in preventing too great a charge upon the tenantry. In such case only is it to be recommended, and it will be observed that in the prospectus of the General Land Drainage Company no reference is made to their power to charge for fifty years.

The two English Companies' Acts which have since been obtained—*i.e.* the Land Improvement Company's Act and the Land Loan and Enfranchisement Company's Act—do not con-

* Mr. Brodie, the Secretary to the West of England Company, in his letter to the writer says, in speaking of the privilege referred to, "Consequently this Company's Act enables owners to improve their estates without any outlay to themselves, inasmuch as only the interest has to be paid; and tenants willingly pay, as additional rent, 5 per cent. on the cost of improvements. All other Acts require the owners to liquidate the principal within a certain term of years, the annual payment being more than tenants are willing to pay."

tain the power to charge for even as long a term as the less period (thirty-one years) to which the General Land Drainage and Improvement Company are limited, and both the Irish and Scotch Acts are subject to the same restriction.

7. Having placed before the Society in a somewhat discursive manner the arguments bearing upon the important point—the period within which the cost of improvements may be repaid—we will now describe as briefly as possible the several powers and modes of proceeding of the Companies.

I.—The West of England and South Wales Land Drainage and Inclosure Company.

This Company was incorporated by the Act 11 & 12 Vict., cap. CXLII., for the purpose of "enabling owners of limited interests in land to charge the same for the purposes of drainage, irrigation, warping, embankment, reclamation, inclosure, and improvement."

It should be observed that this Company's Act does not extend to the erection of farm buildings nor cottages, nor in fact to any other "buildings" than those necessary and proper for executing the contracts which are by the Act authorised to be made.

This Company has almost, if not entirely, devoted its powers to the execution of works for landowners, though it does not withhold the application of its money where proprietors who prefer it take the responsibilities upon themselves.

The terms upon which the Company execute works of improvement are not very clearly stated in their prospectus, which sets forth that after inspection of the lands to be improved a report is made to the Company, a copy of which is furnished to the proprietor, when the Secretary communicates the terms for which the Company will execute the work. It is specified, however, that 5*s*. an acre is the charge for engineering and inspection visits during progress of the works (exclusive of travelling expenses), independent of the additional charges for provision of money and the use of the Act.

Where landowners seek the use of the powers of the Act simply to charge their estates with any outlay that they themselves may make, the Company's commission is 2½ per cent. on the sum chargeable on the lands.

In no case is any investigation of title necessary.

The West of England Company do not limit their operations to estates to be charged under their own Act, but undertake work under other Acts of Parliament, either on commission or by contract, for proprietors not requiring to borrow the cost.

II.—The General Land Drainage and Improvement Company.

This Company was incorporated by the Act 12 & 13 Vict., cap. XCI., for "the execution of draining, irrigating, warping, and otherwise improving of waste and other lands, and the executing of other improvement works in England and Wales."

The powers of this Company include the erection of farm-houses, cottages for agricultural labourers, and farm buildings of every kind, as well as the making of railways for agricultural purposes, aqueducts, and embankments, irrigating with sewage, with the important additional power of purchasing land by agreement, not exceeding 1000 acres in extent, improving it and selling it afterwards.

The operations of this Company are about equally divided between the execution of work by commission for landowners, and granting loans to landowners of the money they themselves expend in works authorised and approved by the Inclosure Commissioners.

The works are classified under five heads, thus:—

Under Class 1 a landowner may undertake the entire execution of improvements by his own agent and employ his own funds for the purpose, the Company engaging to repay him the amount expended after the works have been approved and passed by the Inclosure Commissioners.

A landowner who has partially drained his estate by means of a Government loan, may thus obtain from the Company the necessary money to complete the improvement, or to execute such other improvements as farm buildings, roads, &c., not authorised by the Drainage Loan Acts.

Under Class 2 a landowner may make use of the Company's powers to execute the improvements as under Class 1, supplying the money throughout, both for the works and the loan on the estate, and employing the Company only to conduct the business through all the official forms, and to convert his outlay and expenses into a rent-charge on the estate.

By this arrangement a tenant for life may use his own money to improve his settled estate without sinking it for the benefit of his successor, but retaining it in the form of an annuity charged on the same estate, as a provision for a younger branch of the family.

Under Class 3 a landowner may commit the whole responsibility of the improvement to the Company, who will undertake the preparation of plans and specifications and the execution of the works with a staff in constant practice; or in the case of buildings, by sub-contractors under the immediate superintendence

of their own surveyor; the Company supplying the money required for the purpose, and ultimately charging the estate with the outlay and expenses.

Under Class 4 the Company undertake the execution of works of drainage or other improvements on commission, for landowners who may be desirous to avail themselves of the experience and skill of the Company's officers and staff, but who may not desire to charge the outlay on their estates.

Under this Class landowners who have secured a Government loan, or who intend to spend their own money, may employ the Company to execute the works on commission, and to make the necessary advances for the purpose until all is completed.

Under Class 5 the Company, at the request and in consultation with the landowner or his agent, will prepare the detailed plans, specifications, and estimates in accordance with the requirements of the Inclosure Commissioners, so as to enable the landowner to execute the works by his own agent and with his own money, and to receive repayment from the Company of the amount expended when the works have been approved and passed by the Inclosure Commissioners, and the charge on the estate completed.

It should be understood that this Company does not enter into "contracts" for works by which they can derive a profit, but that a commission only is charged in addition to the actual cost.

The terms of the Company under each class of works are as follows:—

"Class 1. For all works executed on loans under this Class a commission of 5½ per cent. is charged on the amount paid to the landowner.

"Class 2. Where the landowner only requires the powers of the Company's Act to charge his own money on the estate, the commission is 3½ per cent. on all works.

"Class 3. Where the Company undertake and are responsible for the entire improvement, the commission on drainage is 7*s*. 6*d*. per acre, and the surveyor's charge is 4*s*. per acre, including travelling expenses.

"On all other improvements the Company's commission is 7½ per cent. on the outlay, and the surveyor's charge is 5 per cent.

"Class 4. The charge for works executed under this Class is 9*s*. per acre for drainage (inclusive of travelling expenses where the area exceeds 100 acres), and 5 per cent., with the usual surveyor's charges, on all other improvements."

"Class 5. The commission for works under this Class is 7½ per cent., inclusive of all surveyor's charges.

"Where the outlay in any improvement exceeds 10,000*l*., special terms and arrangements may be entered into.

"With this Company, as with the last, no preceding investigation of title of any kind, &c., is required, nor is it necessary to make any inspection of the title-deeds; so that no legal expenses are incurred, and the only attendant charges are the fees to the Inclosure Commissioners and the actual payments made by the Company for stamps, advertisements, &c. These, however, with the Company's commission, are all included in the capital sum charged on the estate."

Mr. Horace Broke, the secretary, writes as follows:—

"The rate of rent-charge, of course, depends upon the state of the money market, besides being influenced to some extent by the amount of the outlay; the insurance offices from whom the loans are usually procured require about one-half per cent. more than the current rate on ordinary mortgages, on account of the advantage to the landowner of being able to pay off the debt by instalments, and also expect a still higher rate on loans of less than 2000*l.*, because of the trouble of collecting and apportioning the half-yearly repayments, which increases in an inverse ratio to their amount. All the charges created under the Company's Act, in cases where the loan has exceeded 2000*l.*, have been taken at 4½ per cent., with two or three exceptions; on smaller loans the rate has been somewhat higher. The following table shows the amount of annual rent-charge for repaying principal and interest at those rates, according to the amount of the loan and the number of years over which the charge has been spread:—

Amount of Loan.	Term of Years.	Rate per Cent. £ *s.* *d.*
From 500*l.* to 1000*l.* ..	22	7 10 11
,, ,, ..	25	7 1 0
,, ,, ..	31	6 7 7
From 1000*l.* to 2000*l.* ..	22	7 7 6
,, ,, ..	25	6 17 6
,, ,, ..	31	6 3 11
From 2000*l.* upwards ..	22	7 4 2
,, ,, ..	25	6 14 1
,, ,, ..	31	6 0 4

"You are probably aware that under their Act this Company generally spread the repayment of the charge over the period of thirty-one years,* while the Lands Improvement Company

* The Company have, in fact, the power to charge for 50 years in cases of land improvement, but they have seldom used it. In certain instances an extension of term would be exceedingly beneficial to reversionary as well as present interests, and when a landowner in the prime of life applies his own personal money to the drainage of a property in which his interest ceases at his death, under Class II. of the Company's rules, there can be no reason why the full term of 50 years should not be adopted.

cannot extend it beyond twenty-five, and the Government Drainage Acts fixed twenty-two years as the lowest term allowed.

"I forward with this letter one of the Company's prospectuses, from which you will see the rates of commission which they charge under their different classes of operations, which is of course higher where, in addition to finding the loan on completion of the improvement, they have also to undertake the responsibility of executing the works, and paying for them during their progress.

"For instance, in Class 1, *i.e.* where landowners execute their own works, the commission is 5½ per cent. on the amount of the loan; in Class 3, where the Company do everything, it is in case of drainage 7*s.* 6*d.* per acre, with 4*s.* per acre for the surveyor's charges, inclusive of his travelling expenses; and for all other improvement 7½ per cent. on the outlay, with 5 per cent. and travelling expenses for the surveyor.

"From a first glance at the difference between 5½ per cent. and 12½ per cent., it might be inferred that it must always be most economical for the landowner to execute his improvements by his own agent; but a little investigation will show that this is by no means always the case; even without examining how far a land-agent can find time for the effective supervision of large and special works, in addition to the ordinary duties inseparably connected with the active management of landed property.

"The figures would at first seem to stand thus, viz.:—

Class 1.		Class 3.	
Outlay	£1000	Outlay	£1000
Company's Commission ..	55	Company's Commission ..	75
		Surveyor	50
Total	£1055	Total	£1125

"But to the first total must be added the cost of preparation of plan to meet the requirements of the Inclosure Commissioners, and of superintendence of the works, as well as the provision of the money laid out during their execution; and a fair estimate of these expenses will prove them to make up a total which so nearly equals, if in truth it does not exceed, the commission charged by the Company, that any difference ought to be more than compensated by the advantages derived from the employment of experienced and scientific engineers, who have especially given their attention to agricultural improvements, as well as of the skilled foremen who are regularly in their service.

"It is evident that this must be peculiarly the case in respect of drainage; where comprehensive and satisfactory

results are more likely to be obtained by adopting the advice of those who are constantly in the habit of planning similar works on a large scale, and with a view to include in one system a considerable tract of land.

"Besides the above-mentioned classes of operations, the Company frequently, at the landowner's request, prepare the detailed plans, specifications, and estimates, in accordance with the requirements of the Inclosure Office, so as to enable him to execute the works by his own agents and with his own money, and to receive repayment from the Company of the amount expended after the improvements have been approved and passed by the Commissioners, and the charge on the estate completed. For the assistance rendered under this arrangement the commission is 7½ per cent., inclusive of the surveyor's charge.

"Again, if a landowner wishes to lay out his own money in effecting improvements, but desires to charge the cost upon the estate, the Company will make the necessary application to the Inclosure Office, and carry through all the other proceedings requisite for giving to the landowner the benefit of their Act. In such cases their commission is only 3½ per cent. upon the outlay, while the landowner obtains a charge with a parliamentary title, taking precedence of any other charges or encumbrances on the estate, which may either be left as a provision for his widow, or for the maintenance of infant children, or be employed as a means of raising money at far less than the cost of an ordinary mortgage.

"The Company likewise undertake drainage or other improvements for landowners, who, while desirous to avail themselves of the experience and skill of the Company's officers and staff, do not wish to charge the outlay on their estates. In such cases the commission is 9*s.* per acre for drainage (inclusive of the surveyor's travelling expenses, where the area drained exceeds 100 acres), and 5 per cent. on the outlay, with the usual surveyor's charges for all other improvements. Under engagements of this nature, which never go into the Inclosure Office, the Company have executed very extensive works.

"In conclusion, I should beg you to remember, that the Company's profit is solely derived from their commission, and that they make nothing either upon the loans or upon the contracts for the works, procuring the former at the lowest rates at which they can be obtained, and charging only cost price under the latter; while they give every assistance to the landowner in economising the outlay, by facilitating arrangements for making bricks and pipes upon the property, by employing all such other approved materials as the estate may furnish, and by providing for their haulage by the tenants."

III.—THE LANDS IMPROVEMENT COMPANY.

This Company was incorporated by the Act of 16 & 17 Vict., cap. CLIV. (amended by subsequent Acts), for the improvement of land, including all the powers of the last-named Company with the addition of planting.

The Company proclaims itself specially as not undertaking works of improvement, and "wishes it to be understood that it is of a strictly financial character, and that the details of the plans and of the execution of the works are not interfered with by them, but are controlled by the landowner and by the Inclosure Commissioners."

This Company's Acts permit:—

"Firstly.—A landowner to contract for and obtain a loan from the Company, for the execution (by himself) of improvement works, with the sanction, in the first instance, of the proposed outlay, and the subsequent approval of the works, by the Inclosure Commissioners' Inspector, the Company receiving for the loan (and expenses) a rent-charge upon the property, repaying the same by half-yearly instalments, over a term not exceeding twenty-five years.

"Secondly.—The Company, acting under the control of the Inclosure Commissioners, will undertake (by means of a competent contractor) to execute improvement works, taking a rent-charge upon the property to repay the contract sum (and expenses) by half-yearly instalments over the term agreed upon, not exceeding twenty-five years.

"Thirdly.—A landowner may also avail himself of the powers of the Acts to charge the inheritance by way of rent-charge with the outlay and expenses from his own funds for improvement works executed by himself under the Commissioners' approval."

The terms of this Company are quoted from their prospectus as follows:—

"In all cases the contract sum or loan, the Company's commission, and the preliminary expenses of the Inclosure Commissioners' Inspector, and of the evidence as to the title to the benefit of the Acts (together estimated not to exceed on the average 7 per cent. on the whole loan if taken up in instalments of not less than 500*l.*) are charged in one sum upon the inheritance for a term varying from fourteen to twenty-five years, according to the desire of the applicant, under the approval of the Commissioners.

"The Company's commission above alluded to, where a landowner executes his own works and contracts for a loan from the Company, is 5 per cent., which, as already stated, is added

to the gross sum charged upon the inheritance, as that if 2000*l.* were outlaid in improvements, about 2140*l.* (including all expenses) would be charged on the lands.

"Where a landowner seeks only to charge the inheritance with the authorised outlay from his own funds by way of rent-charge, the commission of the Company is from 2½ to 3 per cent., according to the amount outlaid.

"The evidence required as to right to the benefit of the Acts is the production to the Company's solicitor of a certified copy of the deed or will (or of a sufficient extract therefrom), under which the applicant holds the lands to be improved, and should that document, for a valid reason, not be forthcoming, the Inclosure Commissioners will accept a statutory declaration as to the applicant's interest in the lands to be improved and charged with the loan. In all cases the Commissioners will require the Company to show that the parties interested as mortgagees in the lands to be improved and charged, have been served with a notice of the proposed loan. In Scotland, Yorkshire, and Middlesex the register of incumbrance must be examined. The applicant's own solicitors will be requested, at the option of the Company, to serve the notices above mentioned, and these may be effected by registered letter through the post-office.

"The solicitor's fee for investigation of evidence is regulated by a per-centage on the loan, viz. 5*s.* per 100*l.* on loans up to the sum of 10,000*l.*, all excesses above 10,000*l.* at the rate of 2*s.* 6*d.* per 100*l.* No fee to be less than 2*l.* 2*s.*, except in the case of loans of and under 100*l.*, where the fee will be only 1*l.* 1*s.*

"The rate of rent-charge to repay capital and interest in twenty-five years is, at the present time—

	£.	*s.*	*d.*	
"In England and Wales	7	1	0	per cent. per ann. for loans, or instalments of loans, under 500*l.*
" "	6	14	1	per cent. per ann. for loans, or instalments of loans, above 500*l.*
"In Scotland	6	14	1	per cent. per ann. for loans, or instalments of loans.

"In making application for a loan, or for power to charge on the inheritance the cost of numerous improvements to be made over a term of years, it is not necessary to furnish detailed plans of the whole intended works, but only complete plans, a general specification of each class of building and estimates, for those buildings to be executed within the following year."

IV.—The Land Loan and Enfranchisement Company.

This Company was incorporated by the Act 23 & 24 Vict., cap. CLXIX., for the same purposes as the last, the outlay in which

is to be repaid by a terminable rent-charge spread over a period not exceeding twenty-five years. The powers extend to Great Britain, Ireland, and the Channel Islands. The Company possess the important special power of making advances for the enfranchisement of copyholds, "repayable either in one sum, or by way of annuity, spread over fifteen years; and as to church lands, such a number of years as may be agreed upon. This power, it is believed, will be extensively used by landowners who would hesitate to clog their estates with a mortgage debt, but who would not have the same objection to charge the enfranchised lands with an annuity which will cease after a certain number of years, and leave the lands free. In many cases land so held might, by improvements (which would very likely never be undertaken while it remained unenfranchised), be at once made to produce an increased income, equal to, if not exceeding, the amount of the annuity. The method of procedure is simple and inexpensive, the costs being controlled by the Copyhold Commissioners and charged on the land.

"The Company's leading object is the advance of money, but the Company's officers are ready in all cases to assist landowners with advice and suggestions as to the best mode of carrying out improvements; and the Company will, if desired, undertake the execution of the works."

The terms of the Company are stated as follows:—

"The Company's commission on advances for improvements is 5 per cent.; special terms may be arranged in respect to large transactions. This, together with the preliminary expenses of the Inclosure Commissioners' Inspector, is added to the amount of the charge. No investigation of the landowner's title is necessary. The Company simply require to be assured, through their solicitors, that the applicant is the landowner within the meaning of the Act. The rate of annual rent-charge for twenty-five years, to repay capital and interest at the present time, ranges from 7*l*. 1*s*. per cent. per annum on small transactions, to 6*l*. 12*s*. 4*d*. on larger amounts."

The terms for the enfranchisement of copyhold are a commission of 5 per cent. on the sum advanced. The rent-charge is 9*l*. 11*s*. 1*d*. for 15 years to repay principal and interest.

The features which distinguish these four Companies may be shortly stated to be as follows:—

The West of England Company almost exclusively apply themselves and their funds to the execution of works by contract or on commission.

The General Land Drainage and Improvement Company are equally engaged in the execution of works on commission, and

in the advance of capital to landowners who desire to execute their works themselves.

The Lands Improvement Company, and the Land Loan Company, act only as a medium of supplying capital to landowners who may desire to execute their works themselves, or to let them by contract, while the Inclosure Commissioners control the proceedings equally of all the Companies where the outlay is charged on the lands improved. The Land Loan Company alone have the power to advance money for the enfranchisement of copyholds.

Before leaving this branch of the subject it may be well to observe that when comparing the cost of works executed through different agencies under the several Acts—namely, those performed by the Companies for landowners with those performed by landowners themselves or their agents—it is essential that the details of the arrangements in each case should be fairly and fully considered. In the former case it is generally so managed that all materials and labour of every kind and description shall be included in the contract, and paid for by the contracting Company, to be charged on the improved property, even though stone and timber is supplied by the landowner and the haulage done by the tenantry, while in the latter case home-found materials are as frequently given without any charge or are furnished at a nominal cost, and the tenants are required to do the haulage without payment or at a much less cost than in cases where there is a contracting party to pay for it. There is no greater source of misapprehension than that founded upon these varying practices, and comparisons are sometimes made disadvantageously to a Company which, if the details were carefully dissected, would be found inappropriate.

The Legislature evidently considered that it was right that the *whole* cost of all legalised improvements should be charged on the improved property, inasmuch as after two applications to Parliament, the "Lands Improvement Company" obtained powers to charge on estates the whole outlay in buildings and planting in substitution of three-fourths the cost of the one, and half the cost of the other. To resist this admitted principle, and to limit the outlay to be charged to less than the actual total cost, could not fail to have the effect of preventing desirable progress.

It should here be stated that the aggregate expenditure in works executed in England and Wales under the several Companies' Acts that have passed under the inspection of the Inclosure Commissioners have been upwards of 4,000,000*l.** This is

* The total amount of money expended under the inspection of the Inclosure Commissioners in improvemnts of all kinds under all the Acts, both public and private, up to the date of this essay, is as near as possible 8,000,000*l.*

exclusive of moneys expended by the two operative Companies for landowners who have not charged their estates, and which proceedings do not come in any way under the *surveillance* of the Inclosure Commissioners. They would amount to a considerable addition.

8. Besides the several Acts already referred to there is the general Act of the 27 & 28 Vict., cap. CXIV., entitled "The Improvement of Land Act, 1864," which was intended to include all the desirable powers of the several Companies. In fact, when enumerating the objects intended by the term "Improvement of Land," all the works specified in the various private Acts are repeated. It goes, however, somewhat further, and includes in its provisions one of the most important privileges which has yet been granted to landowners with limited interests. It enables them to subscribe to railways and canals, the construction of which may benefit their estates, if the Inclosure Commissioners approve of the object.

It can well be conceived that, with the present difficulties in raising capital for the construction of railways, landowners might very materially aid in securing a branch or local line by raising money on their estates proportionate to the extent of benefit they will derive, and by subscribing such amounts towards its construction.

This provision is not sufficiently well known, for there can be no doubt that, within certain limits of amount, no improvement so decidedly increases the commercial value of rural property as the existence of railway communication.

But it cannot be withheld from the agricultural interest, that however desirable it may be to have at command such general powers as were gained by the "Improvement of Land Act, 1864," the same difficulty of securing money under its provisions will prevail as attended the private Money Drainage Act—which it repealed—although the period for the repayment of borrowed money may be extended from twenty-two to twenty-five years. The medium of supply will still be wanted, and nothing can be done without recourse to legal assistance, which is altogether avoided with some of the Companies.

One further remark is necessary to conform to the conditions expressed in the terms of the Society in reference to the influence these various Acts have had upon agriculture.

Though the total amount, 8,000,000*l.*, expended under them amounts to but a small proportion of the money necessary to effect all the improvements they were designed to promote, still the money borrowed under their powers, if associated with that which has been contemporaneously expended from private

sources, would represent an aggregate outlay of no mean amount.

The figures quoted include, in some instances, money laid out in Scotland. If this were deducted, the average annual expenditure of borrowed money in England and Wales would probably be reduced to about 300,000*l.* a year. But this amount does not indicate the extent of benefit resulting from the operations of the several Acts.

The effect has been felt far beyond the limits of the works which have been executed.

Superior intelligence has been brought to bear, resulting in an union of science with practice which cannot have failed to offer examples highly advantageous to the country at large. Moreover, at least one-third of the money expended has already been repaid, and has returned into the channels whence it was diverted.

The Inclosure Commissioners who have controlled the expenditure have been influenced only by the desire to act justly to applicants for loans, as well as to the reversionary interests which they are specially called upon to protect. Their Inspectors, though not all selected from the same rank in life, have been animated by one desire, to improve the quality of the works they have been called upon to inspect; and the landed interest has had the additional benefit of the special skill and experience which have distinguished the several Companies.

P.S. This article would be imperfect as an epitome of recent Legislation on Land Drainage and Estate Improvements in England and Wales, were not some reference made to two Acts of Parliament, which have passed the Legislature, since Mr. Pusey's Act of 1840, for the improvement of outfalls.

The first which became law was that of the 10 and 11 Vict., cap. xxxviii., called "Lord Lincoln's Act," which merely provides for the compulsory *clearing* of *existing* ditches neglected by those whose duty it is to keep them open; and the other is known as the "Land Drainage Act, 1861," 24 and 25 Vict., cap. CXXXIII., which enables owners of land to obtain compulsorily an outlet for the water of drainage through any person's property interposing between the lands drained and the natural outfall. The expenses and trouble, of putting either measure into operation, practically act as a bar to proceedings under them as far as simple outfalls go.

J. B. D.

22, *Whitehall Place, Westminster,*
February 1867.

IX.—*The Farming Customs and Covenants of England.* By Clement Cadle.

Prize Essay.

It is obvious that in an Essay on this subject the principal difficulty of the writer is to so arrange the matter that it shall be available with facility for reference by the reader, and at the same time be so subdivided as to be fully discussed within the limits usually assigned to an Essay in the 'Royal Agricultural Journal;' for it is a subject that is little understood as a whole, while almost every agriculturist is necessarily more or less conversant with the customs prevalent in his own neighbourhood, and, as is usual in these cases, most people think the system they understand is the best that can be adopted. In applying to this subject, which is as important as it is diversified, our experience as agricultural valuers and land agents, we will first pass in review the customs now existing, and afterwards make some suggestions for an agreement to improve them, and at the same time to ensure good farming, so that estates may be handed over in satisfactory condition to incoming tenants.

We will first notice the customs as to the various times of entry:—

January 1st, New Year's Day.—There are very few entries at this date, and of those the customs would be similar to those of entries at other dates in the neighbourhood.

February 2nd, Candlemas.—This is a very common time of entry in the West of England, and the customs attending it are similar to those of Lady-day entries in the same districts. The incomer usually has the right to go upon the stubbles to plough after the 1st of November, and often claims stabling for his horses, and, in the house, room for their attendant.

On the 2nd of February the outgoer gives up the whole of the land, except a meadow near the buildings, called a "boozy pasture," for his cattle to run in till May the 1st; on many light-land farms he also claims a right to consume his roots on the land where they are grown until the 25th March.

The outgoer retains the use of yards and buildings, except part of stable, until May 1st, to consume his hay, straw, &c., and he also claims use of the farm-house, except one room below and one upstairs for servants, as before mentioned.

The outgoing tenant claims the right to plant an offgoing crop on sometimes one-fourth, but usually on one-third, of the arable land; to two rooms in the house, and also to half the barns and granaries for harvesting and storing the crop until 1st May twelvemonth following the expiration of tenancy; but many

persons contend that such wheat crop must be planted before the 2nd February, otherwise the outgoer loses his right to enter upon the land to plant it.

The straw from such wheat crop belongs to the incoming tenant. Much trouble often arises from the outgoer refusing to thrash to supply the incomer with straw, and sometimes even going so far as to compel the incomer to thrash the crop so as to get straw. To avoid this, a custom is becoming prevalent for the outgoer to thrash his corn in the fields, leaving the incomer to haul the straw home. This, however, should be resisted, as it cannot be rightly claimed, the few years which have elapsed since the application of steam to thrashing-machines not being sufficient to establish a custom.

The outgoer is allowed the seed-bill, and often for sowing and harrowing in, but must preserve the young seeds from the 1st November. He has also to allow the incomer to plant seeds in his offgoing crop.

It is seldom that any allowance can be claimed for manure, improvements, tillages, or other work done by outgoers except by agreement.

This is the principal time of entry in Cumberland, Hereford, Monmouthshire, Lancashire, and the West Riding of York; and partly so in Cheshire, Gloucestershire, Westmorland, Worcestershire, North and South Wales.

Lady Day.—There is greater diversity in the customs of Lady-day takings than in those of any other entries. In many instances they are identical with the customs of Candlemas takings, while in others they resemble those of Michaelmas, whilst in a few respects they are distinct from either.

Commonly the incoming tenant takes possession of the meadow-land some time previous to the commencement of the tenancy; in many instances he also goes upon the land to do the brush or stubble-ploughing, and sometimes to plant the wheat and other corn, whilst the outgoer retains a meadow, the house, buildings, and yards, to consume his straw, fodder, and roots, until May 1st. The outgoer is paid for his seeds, and in the West he takes an offgoing crop, of which crop the incomer in some places takes every fourth stock, and in others every third, probably as a set-off against the rent of the land on which it is grown. He also in some instances claims to be paid for the preparation of land for the spring corn, and sometimes for a portion of the artificial food and manure.

As a rule, in the Eastern Counties the outgoer does not take an offgoing crop; and here he has to be paid for tillage done to fallows, and other work performed in the previous summer; and the taking assimilates in a great extent to Michaelmas entries.

The Lady-day or Candlemas entry is undoubtedly the best time of year for arable farms, especially if the incomer has the right of pre-entry to plough: but for grazing farms Michaelmas is perhaps preferable. This (Lady-day) is the principal time of entry in the following counties:—Cheshire, Derby, Dorset, Huntingdon, Leicester, Lincoln, Northampton, Nottingham, Rutland, Shropshire, Somerset, Stafford, Warwick, North and East Ridings of Yorkshire, and in North Wales.

It is also prevalent in Bucks, Bedford, Cambridge, Cornwall, Cumberland, Devon, Gloucestershire, Hereford, Northumberland, Nottingham, Surrey, Westmorland, Wilts, Worcester, West Riding of York, and South Wales.

May Day.—There are only two counties in which this is the period of entry, viz.:—Durham, and a portion of Northumberland; and in these cases the customs so closely resemble those of the Lady-day entries, that we do not deem any special notice of them necessary.

Michaelmas.—This "taking" undoubtedly allows the outgoer the greatest opportunity for fraud, should he be dishonest, as it is impossible for the incomer's valuer to ascertain with accuracy whether all the work charged for, such as scarifying, harrowing, &c., has been duly executed; nevertheless, the cost is generally less to the incomer, except when he has to pay for manure.

In this taking the general custom is for the outgoer to prepare the fallow and do the summer work, such as planting turnips, which the incomer has to pay for, together with the rent, &c., of that portion of the farm. The outgoer in some cases holds the principal portion of the fold-yards, barns, stack-yards, and house, until the spring, to consume his straw; in others he gives up the straw, &c., at a consuming price (usually two-thirds the market-value); and in some cases the outgoer is paid half the cost of fallowing the previous year. Where it can be effected it is obviously better for both outgoer and incomer to pay the value of crops, and let the outgoer plant them.

The outgoer is also repaid the bill for seeds, and sometimes cost of sowing and harrowing in; likewise in other cases an additional payment if the seeds are good. He is also allowed to charge for liming and sheep-folding; but we very much doubt whether any claim for corn consumed or for artificial manure could be sustained, except by agreement, as the use of these is of too modern a date to support a claim by custom.

In Kent, and a portion of Surrey and Sussex, there is a custom to allow also for what are called half-fallows and half-dressings, the allowance being made where only one crop has been taken since such fallowing or dressing.

The outgoer in many cases also claims to be allowed for the manure made in the yards, &c.

This is the principal time of entry in the following:—Bedford, Berks, Essex, Herts, Hants, Middlesex, Kent, Norfolk, Oxford, Suffolk, Surrey, Sussex, and South Wales. It is also common in Bucks, Cornwall, Cambridge, Devon, Dorset, Durham, Gloucestershire, Huntingdon, Leicester, Notts, Northampton, Somerset, Worcester, and Wilts.

Having thus shortly treated of the periods of entry, we will proceed to give the customs of each county, taking them in alphabetical order to facilitate reference. Probably many a reader will interest himself in the customs of his own county, who would not go through a long article embodying those customs under the heading of "date of entry."

The following customs have been compiled from various sources, but principally from information given in answer to direct application—we having written to upwards of 300 gentlemen, including land-agents, agriculturists, and auctioneers, in every county. We are also indebted to the 'Journals of the Royal Agricultural Society,' Wingrove Cooke's 'Agricultural Tenancies,' Dixon's 'Law of the Farm,' in addition to our own personal experience and observation.

BEDFORDSHIRE.—This county had originally the Lady-day system of letting. Michaelmas takings are now generally adopted, and Lady-day entries are becoming rare. The farms are usually held from year to year, leases being exceptional, but latterly many leases have been granted.

The outgoing tenant cultivates the fallows, carts the manure out, mows and stacks the hay. The valuation between the outgoing and incoming tenants comprises the hay, straw, and root crop at a consuming price. Sometimes the outgoing tenant browses his own straw and consumes his hay on the farm, but in most cases it is valued to the incoming tenant, the straw at per acre and the hay at per ton; also the acts of husbandry on the fallows, which include ploughing, scuffling, and cartage of manure, also the value of the clover-seed, and the cost of sowing and harrowing-in of the same. The manure is left on the farm without payment. The outgoing tenant retains half the house and homestead until the following Lady-day, for the thrashing and marketing of his corn.

We are indebted to Mr. Charles Stafford, of Bedford, for information respecting the customs of this county, and also for revising the same. It has also been revised by Mr. M. Reynolds, of Old Warden.

BERKSHIRE.—Michaelmas day is the time of entry in this county; the incoming tenant has the option of an entry at Lady-

day to sow the seeds and work the fallows, or he may leave this work to be performed by the outgoing tenant, and to be paid for by valuation. The hay and straw are usually taken to at a feeding price, but in some cases tenants are allowed to sell wheat-straw. The manure belongs to the incoming tenant, and nothing is allowed for artificial manures or other improvements, unless by special agreement. The buildings are usually put in repair when a new tenant enters, and he is then bound to maintain them, the landlord finding materials.

Mr. W. Bulstrode and the Committee of the Hungerford Farmers' Club have revised the above, and are of opinion that it is correct.

BUCKINGHAMSHIRE.—The customs in the south and south-east of this county are very similar to those just described. The entry is usually at Michaelmas, the incoming tenant having the right of entry on the 1st of April, to work the fallows and sow the seeds, or he may allow them to be valued in the usual way at Michaelmas, the valuation to include seeds, carting, and ploughing. Hay, straw, &c., are taken at a consuming price. The manure is left for the incoming tenant, and nothing is paid for unexhausted manures or permanent improvements. Tenants are supplied with materials in the rough, and have to keep the buildings in repair. The outgoing tenant retains the use of the barn, and of part of the house, until the 25th of December, to prepare his corn for market, and the use of the yards to the 26th March, to consume his straw, &c. In cases where the incoming tenant works the fallows, &c., the corn is often sold by auction, and the outgoing tenant then gives up the whole of the farm at Michaelmas.

In the north and west of this county the customs are very different, nearly all the entries being at Lady-day (old time). The incoming tenant has stable room for his team and lodgings for his carter from Candlemas, to prepare the land and sow his spring crops. An auction for the sale of stock is usually held at Michaelmas preceding the termination of the tenancy; but the working horses and implements are not sold until after Christmas, as the outgoing tenant has to put in the wheat crop and draw out the manures, &c. The grass keeping and the hay is usually sold to be consumed on the premises before the end of the tenancy. In some instances the outgoing tenant retains the use of the house and yards until the 1st of May. The corn crops are generally harvested by the outgoing tenant, and the incomer has the straw and fodder at a consuming price; but occasionally the crops are sold, and then the purchaser has the use of the barns and yards to consume the straw and fodder, &c. If there is a crop of turnips it is usually sold, together with a rick

of clover or hay to be consumed with it, the outgoing tenant accommodating the purchaser with hurdles, and in this case a time is named by which the crop must be consumed, so that the incoming tenant can prepare the land for barley. The tenant keeps the premises in repair, being provided with materials in the rough within six miles. The landlord usually finds draining pipes as the tenant requires them.

Mr. George Bennett has kindly supplied us with information respecting the customs for the north and north-west portions of the county, and we are indebted to Mr. James Rolt, of Pen Amersham, for the customs of the south and south-east.

CAMBRIDGESHIRE.—The entries are at Michaelmas and Old Lady-day, the tenancies being held both by the year and on lease. If the incoming tenant thrashes the corn and carries it to market (within ten miles), he takes the straw, &c., in payment; but if not, he pays for the straw, &c., by valuation. The hay is taken to at a consuming price, and the manure at two-thirds its value; draining and permanent improvements are not paid for, except under agreement. The incoming tenant generally sows the turnips and cole-seed, and pays for the acts of husbandry, viz., ploughings, rolling, and harrowing, also the cartage of farm-yard dung and artificial manures. Mangold is allowed for at a consuming price. The outside of the house and buildings is generally kept in repair by the landlord; and the inside, and also the gates, stiles, and fences, by the tenant. Sometimes, however, the tenant makes all repairs, the landlord furnishing rough materials.

CHESHIRE.—Lady-day holdings from year to year are here the custom. Generally with written agreements which contain compensation clauses. The incomer usually obtains possession of the meadows and tillage land on the 25th of December, the pasture on the 2nd of February, and of the boozy pasture, house, and buildings on the 1st of May. Formerly the meadows and tillage land were given up on the 2nd of February, together with the pasture. The outgoing tenant takes his away-going crop of wheat of one-half after the green crop, and two-thirds after summer fallows, and has an allowance for clover and grass seeds which have been sown in the last year. Hay and straw may not be removed, except near large towns, when the occupier must bring back an equivalent quantity of dung. The outgoing tenant is allowed nothing for the manure left on the premises. Compensation for improvements is very rare; the landlord having put the buildings into repair, expects the tenant to maintain them on being supplied with materials in the rough.

Revised by Mr. George Jackson, of Tattenhall Hall, Chester.

CORNWALL.—The holdings in Cornwall are chiefly divided

between Lady-day and Michaelmas; Midsummer and Christmas takings are becoming exceedingly rare. The farms are usually let on lease for terms varying from seven to twenty-one years. There are, however, several instances of verbal agreement from year to year. Permanent and unexhausted improvements are not allowed for, except in a few cases. Draining is usually performed by the landlord, the tenant paying a percentage on the outlay, but occasionally it is done jointly. The Lady-day valuations comprise the growing wheat crop, and the acts of husbandry on the barley, oat, and turnip land; and, on the Michaelmas holdings, the acts of husbandry on the root crops and fallow. It is, however, very usual, on a Michaelmas holding, to have a special agreement for entry at Midsummer to prepare a wheat tillage, and cultivate the roots, and on a Lady-day holding to have an entry at Christmas or Candlemas to prepare the land for spring crops, the outgoer being compensated for the land taken. Hay, straw, and dung left on the farm are the property of the incoming tenant. The outgoing tenant allows for the repairs necessary to the gates, fences, thatched roofs, &c. The Michaelmas tenant, on leaving, has the use of the barns and premises until Christmas or Candlemas, and the Lady-day tenant until the second week in May.

CUMBERLAND.—Candlemas is here the usual time of entry, but in some localities there are Lady-day takings; leases and agreements are the rule, and yearly takings are very exceptional. Tenants are obliged by custom to keep their full stock of sheep and cattle up to the time of leaving, and may then sell the hay and straw which remain, but this custom is found to work very badly, and now it is usually agreed that (except a specified quantity of each), all the hay, straw, and roots shall be consumed on the farm. The incoming tenant claims the manure free of charge. The outgoing tenant is paid for the rent, rates, taxes, seed, and labour on all dead or bare fallows in the last year, and the cost price of clover and grass seeds sown the preceding spring, if left uninjured. When the entry is at Lady-day, the outgoing tenant is sometimes obliged to consume two-thirds of the hay, straw, and roots; and where the entry is for the land at Candlemas, and the buildings at May-day, all the hay, straw, roots, &c., are to be consumed, and the manure left for the incoming tenant. When this last is the custom, the outgoer is only paid for one ploughing and harrowing, seed, wheat, carting, spreading manure, and the artificial manure put upon the dead fallow. Gates and fences are left in tenantable repair, or the incomer is paid for dilapidations.

DERBYSHIRE.—Lady-day is the invariable time of entry in this county, with a right of pre-entry on February 1st to plough

stubbles and fallows, and also to manure meadows. The incomer takes possession upon payment of the seed-bill, and, in most cases, for manure left from last year, or such as will only benefit the incomer; in other cases the manure belongs to the farm. The compensation to outgoing tenants for improvements is limited; bones, lime, guano, rape-dust, &c., are allowed for. The allowance for half-inch bones extends over six years on grass-land, when pastured; if mown, for only half that time; on some farms one-third or one-half of the cost of the oil-cake consumed during the last year is allowed. The farms are usually let on yearly tenancies, and the occupier has to keep the buildings, gates, fences, &c., in repair. Hay and straw are not generally allowed to be sold off.

This has been revised by Dr. Hitchman, of the County Asylum, and by the Agricultural Society.

DEVONSHIRE.—The change of tenancy takes place either at Lady-day or Michaelmas. In some instances it is at Christmas, but these are rare. There are very few agricultural customs in this county. Nearly all the farms are held under lease or agreement, and any question that may arise is regulated thereby. If there is no lease or agreement the outgoing tenant may in most instances sell everything off. When there are tenancies at will, from year to year, they are determinable by a notice, which may be given by either party six months' previous to the termination of any year of the tenancy. An auction is usually held, and everything is sold off, including the manure. A tenant who goes out at Lady-day does not sow the wheatcrop, except by agreement. The landlord repairs the walls and slated roofs, in some instances also the doors and floors; the tenant has to do all other repairs.

We are indebted to Mr. W. Rolstone Whiteway, of Orley House, Ashburton, for an account and revision of the customs of this county.

DORSETSHIRE.—Lady-day is the usual time of entry. The incoming tenant generally enters upon the turnip land and meadow on the 6th April; other pasture and down-land, with two-year old leys, on the 6th July; and on the 10th October the remainder of the arable land; and on July the 6th of the year following the remainder of the homestead. The incoming tenant is allowed stabling, with straw for food and litter, and the use of the yards for turning up manure; he has also a cottage for his carter and shepherd, and a portion of the farm-house.

The outgoing tenant generally takes the wheat and barley crop, which is valued on the ground, and worked off by incomer. Improvements and artificial manures are not allowed for. The manure belongs to the incoming tenant.

Durham.—The farms are commonly held from the 13th May, but a few are taken at Michaelmas. With respect to the May-day takings, the outgoing tenant is allowed an away-going crop on from one-half to two-thirds of the arable land, the straw from which crop is to be left on the premises for the benefit of the incoming tenant. The remainder of the arable land may be entered on in January or February. The outgoing tenant quits that portion of the pasture land which was depastured in the preceding year on the 6th April, and the other portion on the 13th May. He retains the use of the barns and stackyards until the following Lady-day, on condition that he shall thrash his crops so as to give the incoming tenant a regular supply of straw for use during the intervening winter. The manure made during the last six months belongs to the incoming tenant.

With respect to Michaelmas tenancies the whole of the premises are given up at that time, and the outgoer is paid for the acts of husbandry on the fallows. The incoming tenant has to take to the hay, straw, and roots at a consuming price. Tenants do all repairs except those to walls, timber, and roofs. No allowance is made for unexhausted manures or improvements.

Mr. Samuel Rowlandson, of the College, Durham, has supplied us with most of the above information.

Essex.—The tenancies commence at Michaelmas, and the outgoing tenant is entitled to the use of the barns until the following Lady-day.

The incoming tenant has to pay for the acts of husbandry on the root-crop and fallows, including the rent, and in many instances the tithes and rates. Hay is valued to the incoming tenant at two-thirds the market price. The outgoing tenant may fodder out his hay and straw; or the incoming tenant may thrash the corn and take it to the market (not more than ten miles), and take the straw, &c., to pay expenses. The manure is measured in heaps, and valued to the incoming tenant at so much a yard.

Hay and straw may be sold off, on manure being brought back, load for load. The tenant does the repairs, the landlord providing materials within 10 miles.

Gloucestershire.—The takings in this county are chiefly, on the Cotswold Hills at Lady-day, and in the Vale at Michaelmas; but in those parts of the county which border Hereford and Monmouth they are sometimes at Candlemas. With a Lady-day taking, the incoming tenant pays for all acts of husbandry done to the root-crops, with the full amount expended in artificial manure during the last year, and for all winter ploughings, manuring, young clover, &c. When bones are used, an allowance of three years is made on the Cotswold, but not in the

Vale. With a Michaelmas tenancy the incoming tenant takes to all the hay and straw at a consuming price, and pays for acts of husbandry and for manure used on the root crop; but this paying for the guano used with the root crops can scarcely be called a custom, as it only dates back some 20 or 25 years; the outgoing tenant has the use of the barns, &c., to thrash and market his corn, until the first week in May. The Candlemas takings are the same as in Herefordshire.

There is a very injurious custom in this county, which compels the outgoing tenant leaving at Michaelmas to knock the fruit off the apple and pear trees or leave them for the incomer, and as the fruit is not ripe often until the end of October the trees are much damaged in consequence, and the outgoer is not allowed the use of the cider mill to convert his fruit.

Most of the Cotswold farms are let on lease, but the farms in the other portions of the county are more generally held as yearly tenancies. The landlord usually makes the repairs to the homestead, the tenant doing the hauling and finding straw for thatch; the tenant also maintains the interior of the house, and repairs the gates, fences, &c.

Mr. Villar, of Portland-street, Cheltenham, has favoured us with an excellent paper on the tenancies of the Cotswold district, and we have to thank the Gloucestershire Chamber of Agriculture for a revision of the same.

HAMPSHIRE.—Michaelmas is the usual time of entry, with a pre-entry at May-day to sow root crops, and shortly before Michaelmas on a portion of the arable land to prepare for wheat. The hay and straw must be consumed on the farm, and the incoming tenant can only purchase it by agreement. The outgoing tenant has therefore the right of holding the yards and barn until May, to consume his hay and straw, and to thrash his corn. The tenants do the repairs, and the landlord provides the timber.

HEREFORDSHIRE.—Here the holdings are for the most part from Candlemas, though there are a few at Christmas and Lady-day. On the Candlemas and Lady-day takings the outgoing tenant is entitled to an away-going crop of wheat, on one-third of the arable land, and he is paid for the acts of husbandry on the young clover seeds, but not rent or rates. The outgoing tenant keeps the house (except two rooms for servants and the stable), and the "boozy pasture" until the 1st May, and has the use of the barn and part of the stack-yard until the following 1st May, to thrash his corn. The incoming tenant has no acts of husbandry to pay for, and all the manure belongs to him; hay and straw cannot be sold off. Tenants do repairs on being found materials in the rough, the landlord first putting the holding in order.

Hop-poles are usually valued to the incoming tenant. Fixed cider-mills and presses usually belong to the landlord.

We are indebted to Mr. Duckham, of Baysham Court, and Mr. Taylor, of Thingehill, for revising the above.

HERTFORDSHIRE.—The usual time of entry is Michaelmas, with a pre-entry upon the fallows at Lady-day. But this right of pre-entry is fast becoming extinct by the outgoing tenant working the fallows. The incoming tenant has then to pay for the tillages, for the hay at a foddering price, and in some cases for the manure; in other instances he has only to pay for the labour, and for the seed and sowing of the clover, and the acts of husbandry on the root-crop. Rent and rates are not charged on the fallows. Hay and straw may be sold off on the tenant's bringing back an equivalent manure. The incoming tenant now generally thrashes and markets the last year's crop of corn, receiving the straw in payment. When this is not done the outgoing tenant holds the barn and yard until the 1st May ensuing, delivering the straw, &c., to the incoming tenant as thrashed out, and the new tenant has to pay for the thrashing, dressing, &c. The dung usually belongs to the landlord. The custom as to repairs is very variable; they are generally made according to agreement.

We are indebted to Mr. J. A. Nickolds, of Stort Lodge, Bishop's Stortford, for information respecting the customs of this county.

HUNTINGDONSHIRE.—Lady-day and Michaelmas are the times of entry; if the latter, the outgoing tenant is paid for all acts of cultivation done preparatory to the next crop. Roots are taken at a valuation, or the tenant is allowed until the 25th March to feed them off. The hay and straw are usually taken to; the outgoing tenant has the use of the barn, of stabling, and of part of the farm-house until the 6th April, that he may thrash and market his corn. No allowance is made for artificial manures or permanent improvements.

On Lady-day takings, the tenant, after having received notice to quit, may only sow wheat on such lands as the landlord may direct; otherwise he must allow the incoming tenant to enter on such lands any time after Oct. 1st. He must also allow his successor to enter on the land for beans and peas after the 2nd Feb., and on the land for corn, grain, or seeds any time after the 1st March. He is paid for the herbage of the land so entered on, and for artificials used in the production of turnips and cole-seed the last year. The outgoing tenant is allowed for young seeds after fallow, if they are not damaged by sheep or cattle. The acts of husbandry are allowed on the fallows. The allowance for lime is in equal proportions for four years; one-third

is allowed for linseed cake or other artificial food used the year before quitting. The outgoing tenant is allowed for carriage on materials for building, and on drainage tiles, and also five years in equal proportions for the draining.

Contributed by Mr. W. Bowyer, of Southoe, Buckden.

KENT.—The time at entry is either at Old or New Michaelmas. The outgoings in Kent vary very much in the different districts. In the Weald of Kent nearly everything is paid for. The incoming tenant takes the hay and straw at a feeding value, and pays for all unused manures. He also pays for the tillages with the rent, rates, and taxes on the fallows; half manures are paid for with the exception of guano, for which only a third is charged; the incomer also pays for the clover and young seeds, hop-poles, underwood, down to the stub; and on the Chalk Hills (except in the Weald) for the saintfoin, clover, and grass leys. Improvements of almost all kinds are allowed for, including planting young hops, and striking up the lands and hop-gardens to allow the water to run off. Drainage is also allowed for, if with tile, for ten years; and if with wood, for four years. The selling off of hay and straw is prohibited in the Weald, but in many other places it may be done on bringing back an equivalent in dung. Compensation for buildings which have been erected is not made. In East Kent the payment is not so heavy, and as a rule the manure is not charged to the incomer, it being the property of the landlord, and the tenant has only to pay for the labour thereon. A correspondent who has supplied us with much valuable information, but who does not wish his name mentioned, states that the so-called half manures of the county are only one-third the cost of the manures, and not always so much for guano.

Mr. S. G. Beales, Secretary to the Farmers' Club at Maidstone, writes us that the above customs are considered almost correct, but that in some districts they differ a little.

LANCASHIRE.—The usual time to quit a farm in this county is at Candlemas, but the tenant retains a pasture-field, called "the outlet for cattle," and also the house and buildings, until May-day. The outgoer claims half the wheat which is sown after a green crop, and two-thirds of that grown after a fallow. The manure belongs to the farm, the incomer, therefore, pays nothing for it. Generally hay and straw may be sold off. In some parts the meadows have to be manured at specified periods, but there seems to be no general rule as to the intervals between each manuring. The premises are put into repair when a tenant enters, and the landlord expects him to keep them in a proper condition on being found materials in the rough.

LEICESTERSHIRE AND RUTLANDSHIRE.—About three-fourths of the tenancies commence at Lady-day, and the remainder at

Michaelmas. On a Michaelmas holding the incoming tenant pays *on the summer fallows* for one year's rent, rates, and the acts of husbandry; also for bought manures and their carriage, together with the cartage and the spreading of the farm-manure. The *root crop* he has to take at a consuming price, the bought manures and carriage being also charged. On *stubbles* prepared for wheat or tares, the incoming tenant has to pay the cost and transit of any lime used, the cost of the ploughings, the carriage, and the cost of the bought manure, together with the carriage of any home-made manure, and on clover-seeds the expense of the seeds and of sowing. *Hay, clover, and straw*, if taken by the incoming tenant, are to be paid for at a consuming price; if he refuses to take these (but this does not often occur) the outgoing tenant has the farm premises to convert the straw into manure, but the hay and clover are taken too, though he may not remove them.

On Lady-day entries the summer fallows are paid for as at Michaelmas. The incomer has also to pay for seeds of all sorts which are sown, and from which the outgoing tenant has received no benefit; also for the hay, clover, and straw that remains; if, however, there is a great quantity, the price per ton is lowered.

The tenants usually do all the repairs, except to roofs, outside walls, and main timbers; sometimes the landlord provides rough timber. For draining, an allowance is usually made for either four years, when the tenant finds labour only; or six years, when he finds pipes also. The allowance for linseed and cotton cake is a quarter of the cost for the last two years, and the same for lime, but without the cost of the carriage for the second year.

Contributed and revised by Mr. W. Inett, of Ashfordby House, Melton Mowbray. We also wish to thank Mr. Doubleday, of Long Clawson, Melton Mowbray, for the trouble he has taken to obtain information for us.

LINCOLNSHIRE.—The tenancies in this county are principally yearly, and commencing at Old Lady-day for the arable land, and on the 13th of May for the homestead and the pasture land.

The incoming tenant pays for all the bones and approved artificial manures used on the last year's root crop, also for the acts of husbandry on the fallows, the cartage of manure, and, in some cases, for the rent and rates on the fallows. The outgoing tenant usually sows the wheat in the autumn before he quits, and sometimes the spring corn, for both of which he is paid for seed and labour, including the hauling of manure; he has also to pay for a quarter of the last two years' cake-bill, and for the seeds sown and harrowed the spring preceding quitting, if they have not been stocked after the month of October, also for lime used on a four years' principle. The incoming tenant has usually the

privilege of pre-entry after Michaelmas to sow wheat, and after Christmas upon lands intended for fallows, on payment of the value of the sheep-keep (if any). In the Fen districts the outgoing tenant is allowed for claying, the outlay being generally spread over five years. With respect to drainage, if the tenant finds his own tiles he is allowed the cost, spread over five years; but if the landlord finds them, the cost is extended over three years.

We are indebted to Mr. Thomas Sneath, of Sleaford, for information on the foregoing customs, and to Mr. Frederick Andrews, of Lincoln, for a revision of the same.

MIDDLESEX.—Michaelmas is the time of entry in this county. The incoming tenant has to pay for dressings, half-dressings, sowings, and manure; and also for the seeds and sowing of the clover. The metropolis being so close, hay and straw can always be sold off, but the tenant must bring back a load of manure for each load of hay or straw sold. It is usual for the incoming tenant to pay for the manure, and the wheat-straw and hay are taken to at a market price. Permanent improvements and unexhausted manures are not allowed. As to draining, the landlord usually finds the pipes, and the tenant undertakes the labour of laying them; in other instances the landlord does the work and provides the pipes, and charges a percentage on the outlay.

Mr. F. Sherbourne has been kind enough to write to us concerning the customs of this county.

MONMOUTHSHIRE.—The farms are usually entered upon at Candlemas. The outgoing tenant takes an away-going crop of wheat on one-third or one-quarter of the arable land, according to the system under which the farm has been worked. In some localities he has to leave a "land-share," viz. one-third on the ley-ground and one-sixth on the fallow, which is considered the property of the landlord, and which the incoming tenant takes with the understanding that he is to leave the same on quitting the farm. The incoming tenant takes the young seeds by valuation (cost of the seed, with the sowing and labour); but he is not compelled to take to anything else. On leaving, the outgoing tenant can sell off the clover-hay, the straw, or roots (but not the meadow-hay); he keeps the dwelling-house, farm-buildings, yards, and what is termed the home-meadow until the 1st May, and he has the further use of barn and granary, in which to thrash and store his off-going crop of wheat, until the 1st day of May in the following year.

Contributed by Mr. Thomas Stephens, of Huntfield House, Chepstow.

NORFOLK.—Old Michaelmas is the time of entry. The farms are usually let upon lease, and there is no right of pre-entry.

The incoming tenant has to take to all the hay and roots at consuming value, and the grass seeds sown in the spring. There is no away-going crop, but the incoming tenant has to thrash and carry the corn to market, for which he receives the straw, chaff, &c. All the hay and straw must be expended on the farm, and the four-course shift is very strictly carried out.*

NORTHAMPTONSHIRE.—The tenancies commence at Michaelmas and at Lady-day. With a Michaelmas entry the incoming tenant pays for the acts of husbandry, seed, and labour, and for the dead fallows.

The outgoing tenant is entitled to his full crop of roots, and should the incoming tenant object to take to it, he may feed them off on the ground until the first week in the following April; and if the incomer also objects to take to the hay and straw, the outgoer retains the use of the homestead until Lady-day. With Lady-day tenancies there is no away-going crop, but the tenant is paid for the acts of husbandry, and the cost of the seed, &c.; and on the fallows the last year's rent and taxes. All the manure belongs to the incoming tenant. Unexhausted improvements are not compensated for, but an allowance is generally given for draining, extending over three years, if the landlord has provided the pipes.

NORTHUMBERLAND.—The entries are usually on the 13th of May. There is a right of pre-entry after the 1st of December, to plough the land about to be fallowed, to cart manure, sow, and roll the seeds upon the spring corn. The incoming tenant pays for the grass and clover seeds which have not been damaged, and he reaps and carries to the stack the away-going crop of the late tenant. The manure belongs to the incoming tenant. The landlord keeps the walls and main timbers in repair, and the tenant makes the other repairs. There are a few instances, however, in which tenants enter at Lady-day, as on the Duke of Northumberland's estates, where the incoming tenant enters upon all the land at Lady-day, and there is no away-going crop.

NOTTINGHAMSHIRE.—The entries here are at Michaelmas and Lady-day, sometimes New Lady-day, but usually on April 6th. On the Michaelmas tenancies the incoming tenant pays, on the dead fallows, for the acts of husbandry, the rent, rates, and taxes, also the manure or lime applied, and the labour of applying them. He also pays for the turnips at a consuming price, together with two-thirds of the cost price of the bones or other approved artificial manures. On the grass-land he has to pay for one-third of the value of the cake consumed in the preceding

* The manure was formerly left on the farm without payment, but now it is customary for the incomer to pay the "spending" value of the manure left at Michaelmas.—C. S. R.

summer, and for the hay and straw of the last summer at a consuming price, together with the seed-bill, and labour in sowing the seeds.

On the Lady-day takings the outgoing tenant is allowed for the wheat on fallows one year's rent, rates, and taxes, the acts of husbandry, the manure and lime applied, cost of seed and labour in sowing; on the turnip-fallows, for two-thirds the cost of bones or approved manures in some districts, and the whole in others; for hay and straw at a consuming price, likewise for the manure made from produce of preceding summer, and labour thereon, if any; one-fourth the cost of the linseed cake consumed in the last two years, or in some cases half the cost of the linseed cake consumed the last year; the seed-bill and labour of sowing the seed-land, if not stocked after October 10th (if stocked, nothing is allowed), and on the stubble-land ploughing and harrowing, with cost of seed.

N.B. The paying for one-third of the value of the cake consumed in the preceding summer seems somewhat doubtful, and probably sufficient time has not elapsed to make this a custom.

Mr. George Beaumont, jun., of East Bridgeford, and Mr. H. A. Hubbersty, of South Collingham, Newark, have supplied us with the foregoing information.

Oxfordshire.—In the upper part of the county Michaelmas tenancies are exclusively the rule, but about Banbury and the Warwickshire side of the county the farms are entered at Lady-day. The incoming tenant pays for the acts of husbandry on the turnip-land, and also for the clover and other seeds sown with the barley; he usually takes the hay at a consuming price, but if he refuses to take it the outgoing tenant is bound to consume it on the premises. The tenant quitting at Michaelmas sows the wheat before leaving, and is paid for the seed and labour. Compensation is seldom made for improvements.

Mr. Charles Simmonds of Farnborough, near Banbury, has kindly revised the above for us.

Shropshire.—The time of entry in Shropshire is Lady-day, the outgoing tenant retaining the house, buildings, and a "boozy pasture" until the 1st May; the "boozy pasture" being selected by the landlord or his agent. There is usually a right of pre-entry on the stubbles after the 10th November, and on the meadows after Christmas or Candlemas. The outgoing tenant is allowed an off-going crop of wheat, of one-half after a clover ley or brush, after a bare fallow two-thirds, and only one-fourth of the arable land if farmed on the four-course shift. On some estates the landlord or incoming tenant claims one-tenth of the crop for tithe before the outgoer takes his, and the incomer pays the value of the seeds, but if they have been depastured after

the 1st of November nothing is allowed for them. There seems to be no custom as to manure, as on some estates the incoming tenant pays for it, and on others he does not; but usually it is the property of the landlord, and the incomer is not charged for it.

The incoming tenant has a right of pre-entry on the stubbles after the 1st of November, the outgoing tenant having to find stabling for his horses, and on the meadows at Candlemas (but not on the pastures). The new tenant ploughs for his own spring corn. Hay and straw must be consumed on the farm, and whatever remains unconsumed on the 1st of May becomes the property of the landlord.

We are indebted to Mr. George Hilditch, and Mr. James Bourn, of Stourbridge, for information on the customs of this county; and to Mr. Bowen Jones and the Shropshire Chamber of Agriculture for a revision.

SOMERSETSHIRE.—Lady-day and Michaelmas are the usual times of entry, but the greater number are at Lady-day. The customs prevalent in this county are very diverse, differing widely even in adjacent parishes. The four-course shift is the usual one, but sometimes the three-field course is adopted on deep and rich soils. With a Lady-day tenancy the outgoing tenant sows the clover and other grass-seeds with the Lent corn of the previous year, and also the vetches in the autumn of the last year, and the seed is paid for by the incoming tenant; the seeds, however, must not be stocked after the 1st of October. The outgoing tenant usually claims an off-going crop of wheat on one-fourth of the arable land; if not, the incomer has a right of pre-entry to prepare and sow the same: under any circumstances the incomer has a right of pre-entry on November 1st to the arable land not sown with wheat or turnips, to prepare for spring corn, but in some cases the outgoing tenant does the ploughing, sowing, &c., and the incomer pays for the same. When an off-going crop of wheat is taken the landlord has the right of taking one-third of the crop by valuation when fit to cut, and the outgoing tenant retains a portion of the barns, folds, and premises until the 24th of June in the next year to consume his crops. On a Michaelmas entry the tenant has a right of pre-entry on June 24th to prepare for wheat, or he pays the outgoer for acts of husbandry performed thereon. The outgoing tenant is paid for his root crops, and he holds a portion of the barn-buildings and folds until the following 25th of March to consume his wheat crops. In the case of orchards, the tenant must preserve the trees, and if any get destroyed he is obliged to replace them with young stocks. Tenants in this county cannot mow any meadow or grass-land more than once in any one year, nor mow more than half the meadow land in any one

year. Hay, straw, fodder, and roots cannot usually be sold off the farm, and the manure in all cases belongs to the landlord, and must be left for the incoming tenant.

Mr. W. H. Venn has been kind enough to write us on the customs of this county, and we have to thank Mr. James Trask, of Highleaze, Yeovil, and Mr. T. C. Bennett, of Bruton, for a revision of the same.

STAFFORDSHIRE.—The farms here are usually let on annual agreements, the entry being at Lady-day. The incoming tenant pays for all necessary acts of husbandry on the fallows; for the young seeds, if they have not been stocked after November; and for the unconsumed hay and straw—hay, two-thirds; straw, one-third—at two-thirds of the market price. Raw bones and lime are allowed for, extending over three years.* Draining † is paid for, the allowance extending over a period of seven years. The outgoing tenant takes an away-going crop of wheat, the breadth sown being in proportion to the rotation adopted; usually two-thirds after a fallow, and one-half from land on which one crop of any kind has been taken since the fallow, less the reaping and weeding.‡

We were indebted in the first instance to Mr. James Wyley, of High Onn, and Mr. James Bourn, of Stourbridge, for this information, which has been confirmed and enlarged by a Report from the Staffordshire Chamber of Agriculture.

SUFFOLK.—Old Michaelmas is the usual time of entry, the outgoing tenant being paid for the acts of husbandry on the fallows, and also the rent and rates on the same. The hay and manure are taken by the incoming tenant at a valuation. Sometimes the landlord and sometimes the tenant does the repairs to the buildings, &c., the landlord providing the requisite materials, except straw for thatching. The tenant keeps and leaves all gates, lifts, stiles, pales, posts, rails, fences, and going gear of pumps in good repair, the landlord finding materials in the rough. The straw, chaff, &c., of the last crop belong to the incoming tenant, who has to thrash and take the corn to market

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* On most of the large estates under recent agreements, a portion of the purchased manures applied to roots or grass consumed on the farm are allowed for; also a part of the purchased corn and cake, if consumed on the farm by cattle or sheep during the previous year.—*Report of Staffordshire Chamber of Agriculture.*

† Draining is usually done by the tenant, the landlord finding pipes. An allowance is made for this, extending over four years; but if the tenant pay for the whole, seven years' allowance is taken.—*Ibid.*

‡ Repairs of buildings, gates, fences, &c., are done by tenant, the landlord finding materials in the rough.—*Ibid.*

The game is usually reserved by the landlord; upon the best managed estates the tenants are allowed to kill the rabbits from 1st of November to 1st of April.—*Ibid.*

in consideration thereof. It is usual to mow only half the meadow-land, but in many places the tenants mow the whole, and compel their successors to take all the hay, but in such cases a deduction is made by the valuers for an excessive quantity. Draining done within four years is also a subject for allowance.

We are indebted to Mr. Hugh Cawley for information as to the customs of this county, and for a revision of the same to Mr. R. Bond, of Ipswich.

SURREY.—The tenancies commonly commence at Michaelmas. The incoming tenant pays the rent and rates, and the acts of husbandry on the fallows; for half-fallows, young seeds, and leys, for dressings and half-dressings of dung, lime, and sheep-folding, for the hay and straw at consuming price, and for all the manure he finds; also for the underwood down to the stem. An allowance is generally made for drainage, extending over from ten to twelve years. In making a fallow there should be at least four ploughings, but *the time and manner in which these are performed* make no difference in the valuation.

Communicated by Mr. John Simmonds, of Wokingham.

SUSSEX.—Tenancies usually commence at Michaelmas. The customs are divided into two classes. One of these prevails in the north and east of the county, where they are similar to those of Kent and Surrey, the incoming tenant having to pay for dressings, half-dressings, acts of husbandry, with rent and taxes on the fallows, for manure and the hay at a consuming price; he has also to thrash the outgoing tenant's corn, and carry it to market, or if he refuses, the outgoing tenant retains the yards to fodder his stock until May-day, when the incoming tenant has to pay for the manure.

In the remainder of the county the incoming tenant pays for the acts of husbandry, the fodder of the straw, and the hay, at a feeding price.

The tenant usually does the repairs, the landlord providing materials in the rough within a stated distance.

WARWICKSHIRE.—Lady-day is the time of entry in Warwickshire. An outgoing tenant claims an away-going crop of wheat on the fallows, but if it is a "brush" crop it is at the option of the incoming tenant to take to it by paying for the seed and labour, together with the last half-year's rent. The incoming tenant pays also for the breaking-up of winter fallows, but he pays nothing in respect of the work on a turnip fallow. He has no right of pre-entry to prepare for the spring crop, and he often makes an agreement with the outgoing tenant to do the work on his behalf. Hay and straw cannot be sold off; the manure belongs to the incoming tenant. The tenant does the repairs.

WESTMORLAND.—In the north of this county similar customs

prevail to those existing in Cumberland, except that the takings are usually on the 6th April instead of Candlemas; but in the south the outgoing tenant claims an away-going crop of wheat, being two-thirds of the crop raised on fallow, and one-half that raised on a "brush" crop. With this exception the customs are nearly like those of Cumberland.

WILTSHIRE.—Tenancies commence at Lady-day and at Michaelmas, but by far the greater number at the latter period. The incoming tenant has usually the right of pre-entry to prepare and sow the turnip-crop; otherwise the outgoing tenant does the labour and is remunerated for it. The incomer can also enter to sow the clover-seeds with the outgoer's last crop of Lent corn; and at Midsummer he can enter on the second year's ley to prepare for wheat. Manure belongs to the incomer. The outgoer claims the use of a portion of the house, stable, and yards, with the barn, until the Midsummer following, to consume the straw and fodder. In some places near Swindon, where the entries are at Lady-day, the incomer has a pre-entry to a portion of the arable land to sow vetches, and the outgoer retains the arable land sown with corn until the Michaelmas following the termination of his tenancy.

The tenant does the repairs, the landlord finding materials (except straw, lead for windows, and glass), within a certain distance. Hay and straw must be consumed on the premises.

We are indebted to Mr. W. Spearing, of Kennett, near Marlborough, for a revision of the above customs.

WORCESTERSHIRE.—In the middle and southern parts of the county with few exceptions Michaelmas tenancies prevail. In the north and north-eastern parts of the county there are many Lady-day tenancies, and west of the Severn many of the farms change hands at Candlemas, but these are gradually being converted into Michaelmas tenancies. The customs, except as to Michaelmas tenancies vary very much. The prevailing custom on a Lady-day tenancy is for the outgoing tenant to take an off-going crop of wheat from one-third of the tillage, which he thrashes at his own convenience, leaving the straw for the incomer, and he retains possession of the house, buildings, folds, and a "boozy pasture" until the 1st of May; he must, however, provide accommodation for the horses, and two rooms in the house for the men of his successor. He is also paid for the seeds planted with the Lent grain in the previous year, unless they have been stocked subsequently to Michaelmas. The incoming tenant has no right to enter before Lady-day to plough, &c., unless by agreement, nor can the outgoing tenant recover for acts of husbandry performed by him. The customs attending a Candlemas entry are much the same as the above. Upon the termination of a Michaelmas

tenancy the outgoing tenant retains possession of part of the house and buildings, with fold and boozy pasture, until the following Lady-day, to consume the hay, straw, and roots; he is also paid for ploughing and acts of husbandry performed previously to the termination of the tenancy. Here, as in Gloucestershire, the apples and pears must be removed by September 29th, or they become the property of the landlord; and the Council of the Chamber of Agriculture of Worcestershire (to whom we are indebted for most of the above) would recommend a Michaelmas tenancy as the most preferable, with proper provisions for the outgoing tenant to take the fruit-crop, which is frequently not ripe by Michaelmas, in which case the trees are often much damaged in gathering it before.

NORTH WALES.—No farm customs appear to exist in this portion of Wales. The farms are usually let from Lady-day, with a pre-entry at Candlemas. In other districts, as on the hills, we meet with Old Michaelmas and All Saints' Day takings. The off-going tenant on a Lady-day taking usually claims an away-going crop—on the fallow two-thirds of the crop, and on the clover ley one-third. Should he, however, omit to manure the clover ley, he forfeits his share of the crop; in some instances the incomer has to pay for seeds. If it is a Michaelmas taking he only pays for seeds.

SOUTH WALES.—Tenancies usually commence at Michaelmas, although in some counties (Radnor and Brecon, for instance) Lady-day tenancies prevail. In the two counties named, there exist customs very similar to those prevalent in Herefordshire, but when there is a Michaelmas taking there cannot be said to be any custom except that the outgoing tenant sells everything he possesses, including hay, straw, corn, and manure. All the incoming tenant has to pay for is the seed sown with the barley crop. Of late years a great deal has been done to effect an introduction of agreements and to give a tenant-right, but this is attended with difficulty. On some estates the incoming tenant is compelled to purchase the manure, and in a few instances the outgoing tenant has been prevailed on to work the fallows, the incoming tenant paying the rent, rates, and acts of husbandry thereon. The holdings are nearly all from year to year, and leases are very seldom granted, there being on most of the estates a feeling of confidence between landlord and tenant.

We have received from Mr. R. H. Harvey, of Haverfordwest, an excellent paper on the Customs and Tenure of Land in South Wales, a great portion of which we have embodied in the above.

YORKSHIRE, NORTH AND EAST RIDINGS.—In these portions of the county the time of entry is at Old Lady-day. The outgoing tenant is allowed an away-going crop from a third of

the arable land. This is usually valued to the incomer before harvest; the rent, rates, and taxes being deducted, as well as the expense of harvesting, &c. The straw and chaff belong to the incoming tenant. The ownership of the manure varies; on some farms the incomer purchases it, on others it belongs to the farm. Unexhausted manures and permanent improvements are not usually paid for, but the principle of compensation is extending.*

The tenants usually keep the buildings and fences in repair, but not the main walls or roofs, and the landlord provides materials in the rough.

YORKSHIRE, WEST RIDING.—Here the farms are generally entered on at Candlemas, but where the West Riding abuts on the North or East Riding the farms are usually let from Lady-day. On the Candlemas takings the tenant does not take possession of the buildings until May-day. The custom varies considerably. In some instances the outgoing tenant is even allowed on the turnip or summer-fallow one year's rent and taxes as well as for all manures purchased, the dressing of the fallows, and the manure, making a deduction for the green crops. On the "half-tillage land" (seeds, bean and pea stubbles) he is allowed half the rent and taxes, the dressings, half the manure, three-quarters for bones, and a third for guano, less one half the deduction for the last green crop. For wheat he gets the full value, deducting a year's rent, rates, &c.; and on the fallows the acts of husbandry and the manure. In other parts there is merely the full allowance for acts of husbandry and manure on lands which have had no crop, and after one crop, then one-half. The manure usually has to be taken to by valuation. Purchased manures are paid for at full cost if no crop has been taken, but after a crop the outgoer receives one-half the value.

We are indebted to Mr. George Richardson, of 20, King Street, Bridlington Quay, for information and revision concerning the North and East Ridings, and to Mr. Matthew B. Hick, of Wakefield, for revision of the customs of the West Riding.

LEASES AND AGREEMENTS.

Very much has been said and written upon the subject of leases, a question which presents itself in so many diversified forms, that it is difficult, if not impossible, to lay down any general rule. Much depends on the character of the landlord, the kind of farm, and the climate. But our experience has

* In the East Riding it is customary for the incomer to pre-enter and commence ploughing and preparing the land (which is not included in the one-third away-going crop) directly after the 1st of January, the outgoing tenant not interfering at all with that portion of the farm, but he has generally to provide stable-room for the incoming tenant's horses required for working the same. The customs in the North Riding are similar to those in the East.

shewn us that farmers prefer leases, as a rule, in proportion as they are capitalists, that is, the more capital a farmer has to invest, the more anxious he is to secure it. There is, however, one point against leases as far as the tenant is concerned, which we do not remember to have met with in the various discussions on the subject, and that is, that at the expiration of the lease the landlord invariably expects an increased rental, while a yearly tenancy may, and often does, go on for the occupant's life without any alteration of rent.

In fixing a time for a lease due regard should be had to the system of cropping; twelve, sixteen, or twenty years, should be the term if the four-course system is adopted; if a five-course, ten, fifteen, or twenty years. We think sufficient restriction would be afforded as to cropping if it were provided that the tenant should not take more than three corn and seed crops in five years, and should have at least two-fifths of the farm under a fallow, clover, or artificial grass crop (not seeded).

The giving of increased length of notice to quit is not so desirable as it appears at first sight. Though it may enable an outgoing tenant to reimburse himself, yet this is done at the expense of the farm, and it is far better for the incomer to pay instead. It is admitted on all hands that the better condition the farm is in the more profitable it is to the tenant, and it is obviously to the advantage of the incomer to pay at once for unexhausted improvements, rather than to spend two or three years with a greater outlay of capital, to restore the land to the state it was in prior to the time when the outgoer learned that he was about to leave.

It has always occurred to us that the greatest evil of the present systems is, the leaving it to the interest of the outgoing tenant to get as much out of the land as possible. An exactly opposite state of things might be produced, and in a very simple manner, without the aid of tenant right, or any complicated machinery, as follows: Presuming that however stringently an agreement is drawn, a tenant, if he wishes it, will find ways and means to exhaust the land to some extent, we would propose to make it decidedly to his interest to leave the farm in a good state.

It is mostly considered very liberal to allow tenants for unexhausted manures in the land; but as in most cases the tenant cannot remove the hay, straw, roots, &c., we would propose to give him the full value of all the manure he expends, for any crops during the last year of his tenancy up to a stipulated amount, say 10*s.* or 1*l.* per acre for all the arable land, and also $\frac{1}{4}$ of what he has expended during the year before. Act liberally to the tenant with regard to corn and cake expended;

and you may be sure that be he ever so bad a farmer, he will see that he will get the benefit of this manure in his crops, and also be paid a second time for it in money. What would be the result? Why, when he quits his farm, and the landlord has it to let, the applicants see good crops on the ground, and are willing to give an increased rent. Thus the course we suggest would tend to the landlord's advantage, and the landlord should bear in mind that if the manure be paid for a second time, he does not pay for it but the incoming tenant; while the landowner gets the advantage of such increased rent. To the incoming tenant, to whom at first sight the system appears productive of hardship, we would say, "The outgoer has grown good crops, the manure from which is left you in proportionately increased quantity;" while you may be sure that the larger crops the outgoer grows, the less likely you are to have your land foul; for it is a well known fact that however well land is farmed, it will get foul with thin crops; and that the best extirpator of couch and weeds is a large crop of turnips or a laid field of corn."

Then with regard to corn cake, &c., most agriculturists are aware that fat animals, and those in best condition, leave the best and most manure behind them, while from animals in poor condition very little improvement reverts to the land; we do not think we are far wrong in stating that one full grown fat animal will leave more benefit behind him than three poor ones. The result of this is that the more liberal the outgoing tenant is, the more benefit the incomer will get in the land.

With regard to draining and other substantial improvements, if the former is done by tenant with the consent and concurrence of the landlord in writing, in a permanent and substantial manner, not less than four feet deep, with a correct plan of such drains, then we think the tenant, upon giving up such plans, and a satisfactory account of the cost of such draining, should be allowed at the rate of $6\frac{3}{4}$ per cent. for every unexpired year less than twenty from the completion of such draining, but if the work has been done within two years he should be allowed the full cost. This is the rate at which the estate would be charged by a drainage company.

If the draining is not done in so substantial a manner, or if no plan or record of cost be produced, then the cost should only be extended over ten years, or even less if the work should have been very imperfectly performed. In case of new buildings erected with consent of landlord, in a permanent and substantial manner, we think that the tenant should be allowed in the same manner as that suggested in respect of draining; but in case the buildings are not erected with the landlord's consent,

and he does not like to take them, then he should give the outgoing tenant leave to remove them, but stipulating that he shall make good the freehold.

We next give the form of agreement we would recommend for adoption; it has been compiled from various sources, and embodies the best part of Lord Lichfield's agreement, which we consider as complete as any we have seen. We also adopt the numbers to each clause for reference, but they need not be put on in practice. The clauses may also be altered to suit special cases.

An Agreement made and entered into this day of , one thousand eight hundred and sixty-seven, between (who and whose heirs and assigns are hereinafter called the Landlord) of the one part, and of (who and whose executors and administrators are hereinafter called the Tenant) of the other part.

Whereby the said Landlord hereby agrees to let, and the said Tenant hereby agrees to take, all that farm, lands, house, cottages, buildings, hereditaments, and appurtenances thereto belonging, now in the occupation of , known as , and situate in the Parish of , in the County of , and containing by admeasurement acres, or thereabouts, and more particularly described in the Schedule hereunto annexed, from the 25th day of March, 1867, to the 25th day of March, 1868 (or end of term if for a lease), and so on year to year, until either the said Landlord or the said Tenant shall give to the other of them (six) or (twelve) calendar months notice in writing prior to the said 25th day of March in any year, at the clear annual rent of pounds payable quarterly (if demanded), on the 24th day of June, 29th day of September, 25th day of December, and the 25th day of March in each and every year during the continuance of this tenancy; but if not so demanded, then on the 29th day of September and 25th day of March in every year. The Landlord reserving all mines, quarries, minerals upon or under the same, and also all timber and timber-like trees, saplings, and oak pollards now or that shall at any time grow upon the said lands and premises, with power to get and remove the same by himself, servants, or any person he or his assigns may appoint, together with all game, hares, fish, and rabbits, and the right for himself, friends, and servants to preserve, shoot, sport, or otherwise kill or attend to the same upon the said lands.

[Note.—*If the lease is for a term of years, instead of from year to year, the above must be altered to suit it.*]

Landlord's Covenants.

1. To either put the buildings in repair at commencement of tenancy, or guarantee their being so put by outgoing tenant, such repairs to be completed within three months of time of entry.

Note.—*If the former tenant agreed to give up the premises in repair, it falls upon the landlord to compel the fulfilment of agreement.*]

2. To keep the outer walls and roofs of all buildings in repair.

[NOTE.—*The landlord should in all cases, for his own and tenant's interest, keep the outer walls and roofs in repair; and, in case of thatched buildings, we think the tenant should be paid for the straw used on such buildings at a consuming price.*]

3. To provide, within one month after application is made in writing by tenant, such bricks, stone, lime, sand, and timber in the rough, within five miles of the said premises, as may be required for keeping the inside of the said premises in repair, and for keeping and making good the gates, stiles, rails, and fences.

[NOTE.—*We consider five miles far enough, as it will generally command a station; but where there is a fixed yard on an estate, or where the town or station is more than five miles off, the distance must be altered to meet it. If the landlord covenants to have the gates, &c., painted by tenant, he should himself provide paint.*]

4. To allow a fair proportion of rent in case of buildings being burnt or injured by fire, until they are restored, and to so restore them in a reasonable time.

[NOTE.—*In many agreements the tenant has to insure the buildings. This we do not consider right, as a tenant would not take a farm at so much rent without buildings. Therefore if the tenant is to insure, a clause must be inserted to that effect.*]

5. To pay the land-tax, chief rents, and landlord's property-tax.

[NOTE.—*This clause is usually put in agreement, although the landlord is bound to pay or allow the land-tax and property-tax.*]

6. To allow for all damages done by game exceeding 20*s*. per acre for each and every acre so injured, and for any damage done to crops in the exercise of rights reserved in regard to mines, minerals, quarries, or timber.

[NOTE.—*This is a vexed question; but the landlord has a perfect right to let his land under what conditions he pleases; still we think excessive damage should be paid for, damage by rabbits excepted, if the tenant is allowed to kill them.*]

7. To permit the tenant to destroy rabbits at any time by ferreting or digging on the said lands, but no dog to be used between the 1st day of April and the 1st day of September.

[NOTE.—*This clause can be altered to suit the views of different persons; but rabbits do so much damage, that we are of opinion a tenant should be allowed to destroy them at any time by ferreting and digging on the lands demised. The landlord would always have plenty in the woods and lands not let to tenant, and the sport they afford does not compensate for the damage done by them.*]

8. To appoint a valuer in case of any dispute or disagreement, within 14 days after notice has been given by tenant to that effect in writing, the said notice to contain the name of his own valuer; and in case of non-compliance with this clause, to accept as final the award of tenant's valuer.

[NOTE.—*This we believe to be the best way to settle all disputes, and a much more likely way to get justice to both parties than going to law.*]

9. To pay for the clover and grass seeds sown the last year of the tenancy; and if clean, 5*s.* to 30*s.* in addition, at discretion of valuer.

[NOTE.— *This allowance is usual with the exception of latter part; but we recommend this to induce the outgoer to put the seeds on clean land, much loss often arising to incomer from having to break up a field of seeds to clean it the first summer; therefore it is better for him to pay for their being free and clean from couch.*]

10. To pay for ploughing and autumn cultivation of stubbles, carting and spreading manure on the seeds or meadow-land; and also for cleaning ditches, drains, and watercourses in the autumn and winter preceding end of tenancy.

[NOTE.—*These works a tenant would not do, if he knew he was going to leave; therefore, as it is done for the benefit of incomer, he should pay for it, as if not done he would have to do it himself, and also have the farm injured by neglect in this respect.*

If a Michaelmas entry, there will be the summer following cleaning and preparing for wheat to be paid for, and this clause should be altered to meet it.]

11. To take to the outgoing tenant's share of the crop of wheat in the month of July after the expiration of tenancy.

[NOTE.—*This should be a stipulation in all cases, and the valuers estimate the number of bushels of corn taken, the price being left, if preferred, to the average of two market-days; say end of October and end of March.*

Unless this be so taken, the outgoer retains a share of the buildings, &c., which should always be avoided, it being objectionable to have two masters, or two sets of men on the same farm. In a Michaelmas taking this clause will be left out.]

12. To take to a proportionate part of the hay, straw, roots, at a consuming price.

[*The tenant should also be bound to leave a proportion—say one-tenth—of the last year's hay and straw, for use of incoming tenant.*]

13. To pay all rates and tithe rent-charge becoming due before commencement of tenancy.

[*This clause is required to place the incoming tenant on the same footing as he will leave upon; and it will fall upon the landlord to see that the previous tenant fulfils his agreement.*]

14. To allow for all the lime or artificial manure used upon the arable land in the last year of the tenancy, not exceeding *l.*; and one-third the cost of lime, superphosphate of lime, or bones used the last but one. For cake and corn used during the last year, one-half the cost price, and one-fourth for that of the previous one.

This covenant is not to include the manure or feeding stuffs purchased with proceeds of hay, straw, or roots sold in accordance with Clause 9 in Tenant's Covenants.

[NOTE.—*This should not exceed twenty shillings for every acre of arable, exclusive of dressings applied to meadow land; as although more would be applied to some fields, this calculation would be ample for the whole farm to which it applies; a less sum in some cases—say fifty pounds for every hundred of arable land—would suffice.*

This clause is very liberal. We give our reasons for it elsewhere.]

15. To allow for the land drained in a permanent manner with 2-inch pipes, and not less than 4 feet deep (provided it is done with the sanction of the landlord), on delivery of a plan of drains and outfall, and an accurate account of cost, the full cost less one-twentieth part for each full year since such draining was done; but if such draining is not done in the above permanent manner, or if without a plan or the sanction of landlord, then the said draining is to be left to the valuers, who shall calculate the allowance to be made, after the rate of not less than five, or more than ten years, according to the manner in which it is done.

[NOTE.—*This is also a very liberal clause, if the work be done in a substantial manner, for we see no reason why a tenant should not be allowed at the same rate as a drainage company, provided the work be done as well. Still the landlord should have a voice in the matter, if he is to make himself responsible for full amount.*]

16. To provide or allow for the grass-seeds used to renovate the old pastures after draining, or for laying land down to permanent pasture within the last three years, such grass-seeds to be suitable for the geological formation, or for the class of soil; if used within the last year for permanent pasture, the expense of preparing and cleaning the land in addition.

[NOTE.—*We think that in all cases three years will repay the tenant for laying down to permanent pasture, as he gets better crops in that time.*
No stipulation is made as to mowing, for we believe it is better to mow than to graze in the first year.]

17. To allow one-third the cost of prepared grass manure for each unexpired year of the term of three years since such application; and if bones are used, then one-eighth the cost of the same for each unexpired year less than eight since the application of the same.

[NOTE.—*We should not recommend anything to be allowed for guano or nitrate of soda, used on permanent pasture; we consider it so stimulating that although often of great benefit for the first year, it is apt to leave the pasturage worse afterwards.*]

18. To allow for rearing new quickset fences, the same having been kept clean and well taken care of, the full cost thereof, less one-tenth part in respect of each year since the same was planted.

[NOTE.—*The landlord can here insert, if he pleases, that such fences are to be planted with his own approval in writing; otherwise fences may be planted when they are not desirable.*]

19. For healthy fruit-trees, planted and properly preserved within seven years, the full cost price.

[NOTE.—*This clause can be omitted where no orchards are raised.*]

20. For new buildings (with landlord's consent, if erected in a substantial and permanent manner), the full cost, less one-twentieth part, for each expired year; but if such consent was not obtained, then to be left to the valuers, who shall make their award with reference to the desirability of the erection and likewise to its suitability to other buildings, deducting not less than one-tenth for each expired

year; or if it be not suitable, allowing outgoing tenant to remove the same, he making good any damage done to freehold.

[Note.—*This, we think, gives the landlord sufficient voice in the matter; as if the tenant fails or neglects to get the landlord's consent, he does not get full value.*]

Tenant's Covenants.

1. To appoint a valuer in case of dispute or disagreement within 14 days after notice has been given in writing by landlord or outgoing tenant, or accept as final the award made by his or their valuer; and to take to and pay the said outgoing tenant for the improvements, rights, and privileges allowed him by landlord.

[Note.—*This clause should be in all agreements, to prevent lawsuits.*]

2. To pay the said rent, rates, taxes, tithe rent-charge, and other payments and assessments agreed upon (except chief rents, land-tax, and landlord's property-tax), becoming due during his occupation, and to allow the said landlord to deduct any of such payments that remain unpaid at end of tenancy from the amount of valuation due to him.

[Note.—*From disagreement often arising as to award of division of these payments, we have found it better for each party to pay all charges legally becoming due during the tenancy, in preference to an apportionment of those charges up to date of leaving the farm.*]

3. To pay a rent of 20*l.* per annum for every acre of meadow or pasture land (described as such in Schedule) which shall be broken up without consent of landlord in writing, such rent to be recoverable as rent, or to be deducted from amount of valuation.

[*If the meadow land is very valuable the extra rent may be increased to thirty or fifty pounds; it should be high, as the breaking-up has been done in some cases after notice to quit has been given.*

4. Not to cut down, lop, or top any timber-tree, sapling, or oak pollard, without consent in writing of the landlord.

5. Not to plant two crops of wheat, or more than two white straw crops in succession, on any of the said lands; nor to have more than three-fifths of the arable land under corn or seed crops of any kind in any one year, and to have at least one-fifth under clover and grass seeds, and one-fifth under roots, in each and every year of the said tenancy; and to cultivate and manage the said farm and lands in a good and husband-like manner.

[*We believe by autumn cultivation and use of artificial manure a tenant may take barley after wheat, without injury to the farm; having grown it for some years ourselves, we find the barley of better quality, and the straw thus grown enables the farmer to meet the requirements of the chaff-cutting and pulping system, which would not otherwise be done where the tillage does not exceed two-thirds the area. Where this course is objected to, it can be altered.*]

6. To keep the inside of the farmhouse and buildings, together with the gates, stiles, rail and pail fences, hedges, ditches, watercourses,

roads, bridges, and every part of the said premises (except outer walls and roofs of houses and buildings) in good repair, order, and condition; and so deliver up the same on quitting, the landlord finding materials as provided in Clause 3 of Landlord's Covenants; and to allow the landlord or his agents to enter upon the said premises to view the state of the repairs as above; and if, after two months' notice in writing, the same be not put in such repair, the landlord is allowed to do the same and to deduct the cost of same out of any moneys awarded by valuers to be paid by incoming tenant; and in case of any of the works being left undone at end of tenancy, the valuers to deduct the estimated cost of doing the same from amount of valuation.

[NOTE.—*As we act very liberally to outgoing tenant, he should fulfil his part of the agreement by giving up the premises in good order, or pay for his neglect.*

We believe the most equitable way is for the landlord to keep the outer walls and roofs in repair; the tenant to do all the rest, including gates, stiles, &c., on being provided timber in the rough and other materials at nearest market-town or commercial place; but in the absence of such covenant the landlord cannot be compelled to repair, or find materials, even if burnt down.

7. To prevent all thistles, nettles, and docks from seeding on any part of the said farm, as also all weeds in the hedges, ditches, and waste lands; and in case of neglect of this, the valuers to award damages.

8. To allow his name to be used in any prosecution or action for trespass in pursuit of game, or otherwise, at the landlord's expense, and to sign any notices to warn off trespassers.

9. To consume upon the said farm all the fodder, hay, straw, haulm, and roots of every description, which shall be grown upon it, except that given up by valuation to incoming tenant, and   tons of potatoes,   tons of hay, and   tons of straw, which may be sold in any year, on condition that the full value in money is returned to the farm in oilcake or artificial manure during the same year. Notice in writing to be given to landlord of intention to make every such sale; and in case of landlord requiring it, tenant to send him full account of same, and also of the food or manure purchased in its stead.

[NOTE.—*Insert the number of tons the tenant is to be allowed to sell off in any one year.*]

10. At termination of tenancy to leave on the premises, to be valued to incoming tenant, one-tenth of the hay and straw of the previous year, and not to remove any farmyard-manure, dung, compost, whatever; and at end of tenancy to leave it free of charge for landlord or incoming tenant, and to take proper care of the same.

[NOTE.—*With a Candlemas taking, more than one-tenth of the hay and straw should be left.*]

11. To allow incomer to plant his seeds in off-going crop, such seeds to be sown when the land is dry enough to roll.

12. Not to graze the meadows (except the one named in Schedule) after the 1st day of January, or the young seeds after the 1st day of September previous to end of tenancy.

[NOTE.—*If the tenant is paid full value for his seeds, he should not be allowed to graze them after the* 1st *of September; or perhaps not at all, especially with sheep.*]

13. To plough and properly manage the stubbles, plant the corn, irrigate the meadows, and do any other work pointed out by landlord or incoming tenant, in writing, in the autumn or winter previous to end of tenancy, being remunerated for same by valuers or their umpire.

[NOTE.—*As it is undesirable to have two sets of men or two masters on the same farm, it is better for the outgoing tenant to do the work when called upon.*]

14. To give up the wheat crop by valuation in the month of July next after the termination of tenancy.

[NOTE.—*This we believe to be the best way of settling the wheat-crop, as it is impossible for the valuers to do justice while the corn is in the grass.*]

15. To reside in the farmhouse during the continuance of this tenancy, and not to assign or underlet the whole or any portion of said premises without the consent, in writing, of the landlord or his agent.

[NOTE.—*If a farm is let as a by-take, the clause to reside in the house should be omitted.*]

MUTUAL COVENANTS.

1. It is mutually agreed by both landlord and tenant that any disputes, arbitrations, valuations, and differences that may arise from any cause, in respect to this estate and tenancy, shall be referred to two valuers or parties, one to be chosen by the landlord and the other by tenant; and if either party shall neglect or refuse to appoint and name a valuer within 14 days after notice in writing, with name of valuer, has been given by other party, the said valuer duly appointed shall proceed to the valuation, and his decision shall be final and conclusive; and in all cases, before the two valuers thus appointed shall proceed to their valuations, they shall name an umpire to whom, in case of their not agreeing, any matter may be referred for final settlement.

2. If the tenant shall become bankrupt, or make any assignment for the benefit of his creditors, or be put in prison for more than days, or in case of underletting without consent in writing, or if the rent shall be in arrear and unpaid for five months after it shall have become due, or if the valuers or their umpire shall decide the before-mentioned covenants have been wilfully broken, the tenancy shall cease and determine at the Lady-day following should the landlord so determine, subject nevertheless to the compensation clauses of this agreement.

[NOTE.—*In case of bankruptcy or insolvency, it is questionable whether the tenancy should not terminate at once, on the landlord compensating the creditors for tenant's interest in the farm.*]

3. Also that this agreement shall take place on the 25th day of March next, and continue in force from year to year until six calendar months' notice, in writing, shall be given by either of the said parties to the other of them to quit the possession of the said premises previously to the end of the first or any subsequent year that the same may be held by virtue of this agreement, except the tenancy be terminated by any of the clauses in mutual covenants.

In witness, &c.

[NOTE.—*If any other taking excepting Lady-day be adopted, that day must be entered.*

We believe six months' notice is quite sufficient, as it is opposed to principles of good husbandry and mutual interest for tenant to have time to exhaust the land. See reasons elsewhere.]

SCHEDULE.

No. on Plan.	Description.	Cultivation.	Area.		
			A.	R.	P.

Clarence Street, Gloucester,
March, 1868.

X.—*On the Solubility of Phosphatic Materials, with special Reference to the Practical Efficacy of the various Forms in which Bones are used in Agriculture.* By Dr. Augustus Voelcker.

The comparative efficacy of bones, superphosphate of lime, coprolites, and other purely phosphatic materials, depends in a great measure on the facility with which they pass into the watery liquids present in cultivated soils from which plants derive their nourishment.

Coprolites, apatite, rock-guano, and other varieties of mineral phosphates, scarcely produce a visible effect upon vegetation, even when they are applied to the land in a finely powdered condition and in large quantities, because they are not readily soluble in water, and consequently cannot be assimilated by our crops in quantities sufficient to promote a luxuriant growth.

In order to render mineral phosphates more useful, the manufacturing chemist, as is well known, dissolves them in sulphuric acid, or, in other words, converts them into superphosphates.

Experience has not only proved this to be an economical way of utilising mineral phosphates for agricultural purposes, but has likewise shown it to be the only available means of converting the inactive phosphatic minerals into powerful artificial manures. If it be an admitted fact that such materials in a state of fine powder are of little practical utility to the farmer, it follows that manure-manufacturers should render phosphatic minerals as completely soluble as possible by chemical treatment with acid. It may, however, be questioned whether this proceeding is equally well adapted or equally necessary for converting bone-dust, boiled bones, ivory-dust, and such like materials, into efficacious artificial manures.

It is found that in porous soils, even half-inch bones are sufficiently soluble to yield abundance of phosphatic food to the turnip crop, in accordance with the practice of many good farmers. It is moreover well known that the intimate admixture of phosphate of lime with decomposing organic matters favours the solution of the phosphate, and likewise that phosphate of lime is more soluble in the presence of ammoniacal salts than it is in pure water.

The various conditions which affect the solubility of phosphate of lime in water therefore have a direct practical bearing on the application of bone manures in agriculture.

In the present paper I purpose giving a brief account of an experimental inquiry having for its object to determine the extent to which various phosphatic materials are soluble in water and in some saline solutions. Having directed my atten-

tion more especially to the circumstances which affect the solubility of bones, I shall have occasion to offer some remarks on the relative efficacy of the various forms in which bone manures are presented to the notice of the agriculturist.

Solubility of pure tribasic Phosphate of Lime (Bone-earth) in distilled Water.

In the first place, tribasic phosphate of lime, artificially prepared, was chosen for experiment. Its preparation was simply effected by pouring a neutral solution of chloride of calcium into a solution of ordinary phosphate of soda, taking care not to completely precipitate the soluble phosphate contained in the latter.

The precipitate produced under these conditions was washed until a drop of the washings was not rendered in the slightest degree turbid by nitrate of silver.

Dried and heated, it is a compound consisting of three equivalents of lime and one equivalent of phosphoric acid—hence its name, tribasic phosphate of lime.

100 parts contain:—

Lime (3 CaO)	54·19
Phosphoric acid (PO_5)	45·81
	100·00

Some of the precipitated pure phosphate of lime was left in a moist gelatinous condition and in that state its solubility in water was tested.

The remainder was burnt and afterwards finely ground.

In each case a considerable excess of the gelatinous and moist precipitated phosphate of lime and of the finely-powdered and burnt phosphate was mixed with about half a gallon of cold and distilled water, repeatedly shaken up from time to time, and left in contact with the water for a week. The clear liquid resting on the undissolved phosphate of lime was then drawn off with a syphon and filtered perfectly clear through fine filtering-paper. A pint of the clear solution was then evaporated to dryness, and the heated residue finally weighed. In each case two pints of liquid were evaporated separately, and the following results obtained:—

Amount of Phosphate of Lime ($3\,CaO, PO_5$) *dissolved in*

		1 Pint. Grains.	Per Gallon. Grains.
Pure tribasic phosphate of lime, precipitated, burnt and finely ground	1st Experiment	·28	2·24
	2nd "	·27	2·16
	Mean	·275	2·20
Pure tribasic phosphate of lime, precipitated, and still moist	1st Experiment	·72	5·76
	2nd "	·67	5·36
	Mean	·695	5·56

It will be seen that tribasic phosphate of lime in a gelatinous and still moist condition is much more soluble than it is after being dried and burnt. In the latter condition, according to these experiments, 1 part requires 31,818 parts of water to effect its solution, whilst in a gelatinous condition 1 part dissolves in 14,388 parts of distilled water.

Solubility of tribasic Phosphate of Magnesia in distilled Water.

Phosphate of magnesia being a constituent of the bones of all animals, I tried some experiments with artificially prepared tribasic phosphate of magnesia, obtained by pouring a neutral solution of sulphate of magnesia into a solution of ordinary tribasic phosphate of soda, and thoroughly washing the precipitated phosphate.

In distilled water phosphate of magnesia is considerably more soluble than phosphate of lime, as will be seen by the following determinations.

Amount of Phosphate of Magnesia (3 MgO, SO_3) *dissolved by*

		1 Pint of Distilled Water. Grains.	Per Gallon. Grains.
Phosphate of magnesia, burnt and finely ground	1st Experiment	·87	6·96
	2nd "	·89	7·12
	Mean	·88	7·04
Phosphate of magnesia in a moist condition	1st Experiment	1·78	14·24
	2nd "	1·80	14·48
	Mean	1·79	14·36

Here again we see that the precipitated and still moist phosphate is much more soluble in water than that which had been burnt and ground.

Solubility of Phosphate of Lime in Water containing 1 *per cent. of Chloride of Ammonium* (*sal ammoniac*), *and in solutions containing* 1 *per cent. of Carbonate of Ammonia.*

A large excess of phosphate of lime was placed in a bottle and repeatedly shaken with a solution of chloride of ammonium. After a lapse of seven days the clear liquid was drawn from the undissolved phosphate of lime and filtered; 1 pint was then evaporated to dryness and the residue heated; the heated residue was dissolved in a few drops of hydrochloric acid, and the solution precipitated with ammonia; the precipitate was washed with a little distilled water, and then dried, heated, and weighed, when the following results were obtained:—

		Amount deposited In 1 Pint. Grains.		Per Gallon. Grains.
Precipitated phosphate of lime ($3\,CaO, PO_5$) still moist ..	1st Experiment	2·77	....	22·16
	2nd „	2·67	....	21·36
	Mean	2·72	....	21·76

In the presence of an ammonia salt, phosphate of lime thus becomes much more soluble than in pure water.

The addition of 1 per cent. of sal ammoniac to the water employed in the preceding experiments increased the solubility of phosphate of lime in distilled water nearly fourfold.

Carbonate of ammonia likewise renders phosphate of lime more readily soluble than it is in pure water, but not to the same extent as sal ammoniac, as will be seen by the following results:—

Amount of Phosphate of Lime dissolved by Water containing 1 *per cent. of Carbonate of Ammonia.*

		In 1 Pint. Grains.		Per Gallon. Grains.
Precipitated phosphate of lime	1st Experiment	1·42	....	11·36
	2nd „	1·40	....	11·20
	Mean	1·41	....	11·28

In the next place, I have to record some experiments which have shown me that neither chloride of sodium nor nitrate of soda has any effect in materially increasing the solubility of pure phosphate of lime in water.

Amount of Phosphate of Lime dissolved by Water containing 1 *per cent. of Chloride of Sodium in solution.*

		In 1 Pint. Grains.		Calculated per Gallon. Grains.
Precipitated phosphate of lime	1st Experiment	·52	....	4·16
	2nd „	·55	....	4·40
	3rd „	·58	....	4·64
	4th „	·57	....	4·56
	Mean	·555	....	4·44

On comparing these results with those obtained by dissolving phosphate of lime in pure distilled water, it might appear that the presence of common salt had somewhat reduced the solubility of the precipitated phosphate of lime; I do not, however, think this was really the case, for the precipitated phosphate used in the salt experiments had been kept longer and become less gelatinous and more dense than the specimen treated with distilled water, and direct experiments have shown me that this difference in the mechanical condition of the phosphate slightly affects its solubility in water.

Amount of Phosphate of Lime dissolved by Water containing 1 *per cent. of Nitrate of Soda.*

		In 1 Pint. Grains.		Calculated Per Gallon. Grains.
Precipitated phosphate of lime in moist condition	1st Experiment	·87	....	6·96
	2nd "	·85	....	6·80
	Mean	·86	....	6·88

The material employed in this experiment was recently prepared and very bulky, and on this account dissolved rather more readily than the phosphate of lime of another preparation in the previous trial with distilled water.

Making due allowance for the differences in the mechanical state of aggregation of the particles of the phosphate and the unavoidable errors which attach to all analytical determinations of that kind, I believe the results of the several determinations decidedly prove that neither common salt nor nitrate of soda increases the solubility of phosphate of lime in water.

In the next place, I determined the amount of phosphate of lime which distilled water is capable of taking up from pure bone-ash, commercial South American bone-ash, coprolites, and a number of other phosphatic materials, mentioned in the subjoined tabular statement of results.

In operating upon phosphatic minerals, guanos, &c., it is not sufficient merely to evaporate the watery solution to dryness; for, besides phosphates of lime, water dissolves more or less carbonate of lime, magnesia, and traces of alkalies, which, added to the weight of the phosphate of lime, in many instances would give quite erroneous results. By leaving an excess of the several materials in contact with water for a week, and subsequently filtering, a perfectly clear liquid was obtained in each case; of this two pints were evaporated separately to dryness; the residue was then dissolved in as little hydrochloric acid as possible, and the solution precipitated with ammonia; in some instances the precipitated phosphate was redissolved and thrown down a second time with ammonia, and, after washing with a little water, dried, burnt, and weighed.

The pure bone-ash was made from the shank-bone of a horse; and was washed with distilled water for a long time to free it from all saline matter contained in it before trying the solubility of the phosphate. Its composition in 100 parts was as follows:—

Composition of Pure Bone-ash (from Shank-bone of a Horse).

*Phosphoric acid	40·29
Lime	55·01
Magnesia	·84
Potash	·25
Soda	·03
Carbonic acid	2·99
Sulphuric acid	traces
Chlorine	traces
	99·41

*Equal to tribasic phosphate of lime (bone-earth) 87·29

Amount of Phosphate of Lime dissolved by Distilled Water from the following materials :—

		In 1 Pint. Grains.	Calculated Per Gallon. Grains.
Pure bone-ash (from a very hard bone)	1st Experiment	·13	1·04
	2nd "	·17	1·36
	3rd "	·14	1·12
	4th "	·15	1·20
	Mean	·147	1·18
Commercial sample of American bone-ash	1st Experiment	·25	2·00
	2nd "	·22	1·76
	Mean	·235	1·88
Peruvian guano	1st Experiment	·30	2·40
	2nd "	·33	2·64
	Mean	·315	2·52
Kooria mooria guano	1st Experiment	·15	1·20
	2nd "	·18	1·44
	Mean	·165	1·32
Sombrero phosphate	1st Experiment	·10	·80
	2nd "	·11	·88
	Mean	·105	·84
Monks' Island phosphate	1st Experiment	·13	1·04
	2nd "	·12	·96
	Mean	·125	1·00
Suffolk coprolites	1st Experiment	·09	·72
	2nd "	·07	·56
	Mean	·08	·64
Cambridgeshire coprolites	1st Experiment	·08	·64
	2nd "	·07	·56
	Mean	·075	·60
Estramadura phosphorite	1st Experiment	·10	·10
	2nd "	·10	·10
Norwegian apatite	1st Experiment	·06	·48
	2nd "	·05	·40
	Mean	·055	·44

It will be seen that the earthy phosphates in Peruvian guano are more soluble in water than the phosphates in bone-ash; these,

in their turn, dissolve more readily than the phosphates in hard rock guano or in coprolites. Indeed all the harder and crystallised minerals in the preceding experiments yielded considerably less phosphate of lime to water than the more porous and amorphous materials.

Some of the preceding phosphatic substances were next shaken with solutions containing separately 1 per cent. of chloride of ammonium, 1 per cent. of carbonate of ammonia, 1 per cent. of common salt, and 1 per cent. of nitrate of soda; and the following results obtained:—

Amount of Phosphate of Lime dissolved by Water containing 1 *per cent. of Chloride of Ammonium (Sal Ammoniac).*

		In 1 Pint. Grains.		Per Gallon. Grains.
Pure bone-ash, yielding to distilled water 1·20 grains of phosphate of lime per gallon	.. ..	·39	....	3·12
Commercial bone-ash, yielding to distilled water 1·76 grains of phosphate of lime per gallon	1st Experiment	·12	after 3 days contact with water	·96
	2nd ”	·47	after 12 days contact with water	3·76
Cambridge coprolites, yielding to distilled water ·56 grains of phosphate per gallon	1st Experiment	·20	....	1·60
	2nd ”	·18	....	1·44
	Mean	·19	....	1·52
Suffolk coprolites, yielding ·56 grains of phosphate per gallon to distilled water	1st Experiment	·15	....	1·20
	2nd ”	·13	....	1·04
	Mean	·14	....	1·12

Amount of Phosphate of Lime dissolved by Water containing 1 *per cent. of Carbonate of Ammonia.*

Suffolk coprolites	1st Experiment	·21	....	1·68
	2nd ”	·22	....	1·76
	Mean	·215	....	1·72
Cambridge coprolites	1st Experiment	·19	....	1·52
	2nd ”	·21	....	1·68
	Mean	·20	....	1·60

In all the preceding experiments the presence of ammoniacal salts increased the solubility of the phosphate of lime in the substances employed.

Solutions of nitrate of soda and of common salt of various degrees of strength left in contact with finely-ground phosphatic minerals for a week or longer, I found, dissolved no more phosphate of lime than distilled water did. It is needless to give the detailed results, for they were uniformly negative.

Passing them over, I have now to refer to a number of experiments instituted for the purpose of determining how far the manuring efficacy of half-inch bones, fine bone-dust, and other

forms in which bone manure is sold, is affected by their relative solubility in water.

The raw materials employed in the first series of bone experiments were:—

1. Very hard shank-bones of ox, coarsely ground.
2. Ordinary commercial bone-dust made from rather hard bones.
3. Ordinary commercial bone-dust made from rather porous bones.
4. The pith of ox-horns (sloughs), a very porous description of bone.
5. Boiled bones (the refuse bones of glue-makers).

An excess of each of these substances was placed with pure distilled water, in glass bottles, in some instances for three days, in others for a week or 12 days; the liquid was shaken at intervals repeatedly, then allowed to settle and filtered clear. The clear liquid was then evaporated to dryness, the residue heated in a platinum capsule, and taken up with a few drops of hydrochloric acid. The solution was then precipitated with ammonia, and the precipitate collected, washed, dried, and weighed, when the following results were obtained:—

Amount of Bone-phosphates dissolved by one gallon (70,000 grains) of Distilled Water from different kinds of Bone-dust and Boiled Bones.

		Bone-phosphates dissolved by a Gallon of Water.
1. Hard shank-bones from oxen	1st Experiment after 3 days ..	·48 grains
	2nd „ 12 „ ..	·80 „
2. Commercial bone-dust (made from rather solid bones) ..	1st Experiment after 1 week	3·68 „
	2nd „ „ „	4·24 „
3. Commercial bone-dust (made from rather porous bones) ..	.. .. .. „ „	5·40 „
4. Pith of ox-horns	.. .. „ „	5·36 „
5. Boiled bones (glue-makers' refuse)	.. .. .. „ „	5·90 „

In explanation of these results, I would observe that the material employed in the first experiment was specially selected, washed perfectly clean, and broken up into coarse bits, which, before the experiment was begun, were long soaked in cold water in order to free them from any soluble impurities always present in ordinary bone-dust.

The very hard bone-dust, it will be seen, was scarcely at all affected by water in the course of three days; after a longer period it was somewhat more dissolved; but even then very little phosphate of lime passed into solution, for the actual quantity of bone-phosphates amounted to only eight-tenths of a grain per gallon, whilst in seven days about four times as much was dis-

solved from ordinary bone-dust. The two samples of porous bone-dust, as might have been anticipated, were more soluble than ordinary dust; and the sample of boiled bones, which it should be stated was reduced to a tolerably fine powder before being placed in water, was slightly more soluble than the two preceding samples.

Boiled bones, or steamed bones as they may more appropriately be called—for they are the refuse after the gelatine has been extracted from them by high-pressure steam—vary greatly in composition and in their solubility in water. In many instances this bone refuse yields phosphate of lime far less sparingly to water than good samples of common half-inch bones, from which the fat and but little of the nitrogenous organic constituents have been extracted by boiling.

But although in the present instance boiled bones in the shape of glue-makers' refuse yielded more phosphate of lime to water than the other substances employed did, it must not be inferred that this refuse material always affords, with greater readiness, a supply of soluble phosphates to plants.

The two samples of commercial bone-dust were both, as usual in the case of green or fresh bones, impregnated with grease, which in a great measure prevents their decomposition and their solution in water.

Experiments with hard Bone-Dust.

In the next place, I tried some experiments to test the solubility of bone-dust, made from hard bones, containing but little fatty matter.

The first sample was a specimen of very hard and fine dust; the second sample was coarser; and the third about as fine as the first, but made of bones not quite so solid. On analysis the third sample yielded the following results:—

Composition of fine Bone-dust made chiefly from hard solid Bone.

Moisture	10·36
*Organic matter	30·92
Phosphates of lime and magnesia (bone-earth)	52·44
Carbonate of lime	5·16
Alkaline salts	·84
Sand	·28
	100·00
*Containing nitrogen	3·51
Equal to ammonia	4·56

Separate portions of each of these three samples were placed in glass-stoppered Winchester quarts, and shaken repeatedly with distilled water, the proportions being 500 grains of bone-dust for every decigallon of water. The liquid was then allowed to settle, and after 24 hours' standing it was drawn off and filtered

perfectly clear. A weighed quantity of the clear solution was acidulated with hydrochloric acid and evaporated to dryness in a waterbath; the amount of nitrogen in the dry residue being subsequently determined in the usual manner by a nitrogen combustion with soda-lime. When a watery solution of bone is boiled down to dryness some ammonia evaporates, especially when the bones are in a state of putrefaction; for this reason a few drops of hydrochloric acid were added to the clear bone-solution, and thereby the volatilization of any ammonia prevented.

In another weighed quantity (generally 1 decigallon) of the clear bone-solution the phosphates were determined by first evaporating the solution to dryness, heating the residue in a platinum capsule, and proceeding further as before described.

The bone-dust remaining undissolved was again shaken up with as much distilled water as was employed in making the first solution, it was then allowed to settle for 24 hours, and the filtered liquid was treated precisely in the same way as the first solution.

In like manner a third solution was obtained from the same bone-dust which was employed for making the first.

The object of these successive exhaustions with water was to ascertain if, with the removal of the more soluble nitrogenous constituents of bone, the solubility of the bone-phosphates remained the same or became less.

In the first watery extract the proportion of nitrogenous organic constituents, as we shall see presently, was much more considerable than in the liquids obtained by a second or third exhaustion with water, and as some organic matters appear to exercise a solvent action upon phosphate of lime, it was deemed desirable to try the effects of successive portions of water upon bone.

Calculated per gallon the following results were obtained in the several experiments:—

Table showing amount of Bone-phosphates and of Nitrogen = to Ammonia dissolved by 1 *gallon of Distilled Water from hard Bone-dust, digested for* 24 *hours in Cold Water, in the proportion of* 500 *grains to* 1 *decigallon of Water.*

		Amount of Grains of Bone-phosphates.	Nitrogen	=	Ammonia.
1. Very hard bone-dust..	1st solution ..	·63	9·10	=	11·05
	2nd extraction with water	·70	1·40	=	1·70
2. Somewhat coarser bone-dust made chiefly from solid bone	1st solution ..	2·46	13·26	=	16·11
	2nd extraction with water	2·11	5·49	=	6·66
3. Fine bone-dust made chiefly from solid bone	1st solution ..	2·80	6·30	=	7·65
	2nd extraction	2·10	2·10	=	2·55
	3rd extraction with water	2·80	·70	=	·85

The hard texture of these three samples, more especially that of the first, obviously resisted the solution of the bone-phosphate in water—a result agreeing well with that obtained in experiments already cited.

Cold water in contact with bone-dust, it will be noticed, extracts an appreciable quantity of nitrogenous organic matter, more being present in the first than in the subsequent extracts.

The presence of a comparatively small quantity of soluble organic matter, however, does not appear in these experiments to have increased the solubility of phosphate of lime; for whilst the proportion of nitrogen present in the shape of organic matter was much greater in the first than in the second or third solution, the amount of phosphate of lime remained, practically speaking, the same in each set of experiments.

Experiments with Spongy Half-inch Bone.

A sample of commercial bone-dust, made entirely from porous spongy bones and boiled in an open copper, so as to extract most of the grease, but not to act sensibly upon the gelatine of the bone, was next experimented upon in the same manner as in the preceding instances. The results stated per gallon are given in the subjoined Table:—

Amount of Bone-phosphate and of Nitrogen dissolved by 1 *gallon of Water from spongy half-inch Bone digested for* 24 *hours in cold water, in the proportion of* 500 *grains to* 1 *decigallon of Water.*

		Bone-phosphate. Grains.		Nitrogen. Grains.	=	Ammonia. Grains.
Spongy ½-inch bone	1st gallon of water	5·61	....	27·30	=	33·15
	2nd ,,	2·45	....	4·35	=	5·28

The results of this experiment show plainly that the nitrogenous constituents and bone-phosphates are more easily dissolved from porous though very coarse bone-dust than from fine dust made from solid bone.

A portion of the nitrogen found in the first watery solution of the spongy bone was present in the state of an ammoniacal salt, for the bone-dust moistened with water on the addition of soda-lime, liberated free ammonia, which was readily perceptible by its characteristic pungent smell. The presence of an ammonia salt accounts for the much larger proportion of bone-phosphate in the first solution; for direct experiments with bone phosphate of lime and weak solutions of ammonia salt, as pointed out above, show that the latter exercise a decidedly solvent action upon bone phosphates.

Ammoniacal salts, being very soluble in water, cannot occur in any appreciable quantity in the second watery extract of the

bones; this explains why much less phosphate was found in the second than in the first solution.

Experiments with Bone-Meal and Ivory-Dust and Boiled Bones (refuse bones of glue-makers).

Ivory-dust and bone-shavings, being the turnings or raspings of hard bones, contain rather less organic matter and more phosphate of lime than common bone-dust. The sample employed in the experiments was thus composed:—

Moisture	13·12
*Organic matter	26·12
Phosphates of lime and magnesia (bone-earth)	53·74
Carbonate of lime	5·39
Alkaline salts	·78
Sand	·85
	100·00
*Containing nitrogen	3·28
Equal to ammonia	3·98

Ivory-dust, when free from sand, chalk, or other adulterating matters, is a valuable refuse, which may be applied to all purposes for which bones are used in agriculture. It is particularly useful to the farmer for drying wet and very acid mineral superphosphates. Coprolite superphosphate when rich in soluble phosphate is very apt to get pasty in its transit from the manure-works to the farmer, and in such a condition it is not easily or advantageously applied to a root crop. Moreover, very acid mineral superphosphates should not be applied as a turnip manure without admixture with some other material, on light sandy soils deficient, as is often the case, in lime or other basic mineral constituents which abound in clays or marly soils, and which, by neutralising or precipitating the acid phosphate and free sulphuric acid sometimes present in very acid superphosphates, prevent injury being done to the young plants.

Ivory-dust is not only an excellent material for drying up and greatly improving the quality of mineral superphosphates; it is likewise a very handy material for the production of home-made bone superphosphate; its dusty condition at once secures the absorption of oil of vitriol, and a dry superphosphate can be obtained from it without loss of time and without difficulty by being mixed in a wooden tub* with 25 to 30 per cent. of brown sulphuric acid diluted with an equal weight of water. Such a mixture almost directly dries up sufficiently to admit of being placed in a heap; indeed it is only necessary to mix the acid and ivory-dust as rapidly as possible together.

* A small tub or barrel cut in two may be employed for the purpose, and a considerable quantity may be made in a short space of time.

Whilst speaking of ivory-dust and its uses, I am anxious to put purchasers of this refuse on their guard, for its powdery state admits of the ready admixture of chalk, sand, ground gypsum, and vegetable ivory, which adulterants are not readily detected by the look or feel.

Vegetable ivory in appearance closely resembles bone-shavings or ivory-dust, but, being a vegetable production of the same chemical character as woody fibre, it has as a manuring agent just as little value as sawdust.

Some time ago an adulterated sample passed through my hands, and on analysis yielded results which, for sake of comparison, I place side by side with the composition of the pure substance:—

Composition of Ivory-dust.

	Adulterated with Gypsum and Vegetable Ivory.		Good Ivory-dust.
Moisture	10·01	....	13·12
*Organic matter	40·40	....	26·12
Phosphates of lime and magnesia (bone-earth)	28·01	....	53·74
Carbonate of lime	2·87	....	5·39
Alkaline salts	·77	....	·78
Sulphate of lime (gypsum)	14·44	....	none
Sand	3·50	....	·85
	100·00		100·00
*Containing nitrogen	2·15		3·28
Equal to ammonia	2·61		3·98

Besides gypsum a considerable quantity of vegetable ivory was added to the adulterated ivory-dust, and in consequence both the amount of nitrogen and of bone-earth was much less than in the genuine commercial article.

Bones submitted to high-pressure steam may afterwards be ground to a powder almost as fine as coarse flour, and, when the process has been properly carried out, will be found not to have lost much nitrogen. Such a sample of steamed bone-meal was used in experiments on the solubility of bone materials, and yielded on analysis in 100 parts:—

Composition of Bone-meal (steamed).

Moisture	9·11
*Organic matter	21·25
Phosphates of lime and magnesia (bone-earth)	61·94
Carbonate of lime	4·68
Alkaline salts	1·70
Sand	1·32
	100·00
*Containing nitrogen	2·84
Equal to ammonia	3·45

The bone-meal, ivory-dust, and boiled bones were exhausted with three successive quantities of water, and several solutions were obtained, in which the amounts of nitrogen and dissolved bone-phosphates were determined as before with the following results:—

Table showing the amount of Bone-phosphate and Nitrogen dissolved by 1 gallon of Water left in contact for 24 hours with Bone-meal and Ivory-dust, in the proportion of 500 *grains to* 1 *decigallon.*

		Bone-phosphate.		Nitrogen.	=	Ammonia.
Bone-meal	1st solution	9·10	....	7·01	=	8·51
	2nd „	2·80	....	3·50	=	4·25
	3rd „	1·70	....	3·15	=	3·82
Ivory-dust	1st solution	4·55	....	6·86	=	8·33
	2nd „	2·45	....	3·43	=	4·16
	3rd „	2·80	....	2·74	=	3·33
Boiled bones (refuse bones of glue-makers)	1st solution	4·20	....	17·50	=	21·25
	2nd „	2·10	....	2·10	=	3·27
	3rd „	2·15	....	1·78	=	2·16

In conformity with similar trials the 1st solution in each case contained more phosphate of lime than the subsequent ones.

The glue-makers' refuse, it will be seen, yielded to water about the same quantity of bone-phosphates as the ivory-dust, and the bone-meal about twice as much.

These variations in the proportions of soluble phosphates in the various forms in which bones are used in agriculture, no doubt must have a considerable influence on the readiness with which they are appropriated by our crops.

Experiments with rotten Bone-dust.

Professor Wöhler, of the University of Göttingen, if I am not mistaken, first pointed out that bone-dust, moistened with a little water, in the course of a few days yields a considerable quantity of phosphate of lime to water, and that this solubility rapidly increases with the putrefaction of the gelatine.

Many years ago the late Mr. Pusey, it may be remembered, suggested that bone-dust moistened with water and mixed with ashes, sand, or porous earth should be placed in a heap, and the heap kept moist by occasionally pouring water, stale urine, or liquid manure upon it. Adopting this suggestion, practical men soon found that bones broken into rough pieces with a sledge-hammer, may by this simple means not only be reduced to a finer state of division, but also rendered much more efficacious as a manure for root crops. Wöhler's direct experiments upon putrefying bones afford a rational explanation of the benefit arising from preparing bones in accordance with Mr. Pusey's recommenda-

tion, and as his are the only experiments on record, I deemed it desirable to try the same experiments upon perfectly rotten bones which I had made with other forms of bone manure.

A sample of the bones used in my experiments, on analysis, yielded the following results:—

Composition of rotten Bone-dust.

Moisture	12·02
*Organic matter	28·71
Phosphates of lime and magnesia (bone-earth) ..	49·28
Carbonate of lime and alkaline salts	8·92
Sand	1·07
	100·00
*Containing nitrogen	3·44
Equal to ammonia	4·17

These bones had a dark colour, a pungent smell like rotten cheese, and imparted a deep brown colour to water.

Mixed with a little water and soda-lime they gave off ammonia abundantly, showing that they contained readily formed ammonia in saline combination.

Three successive solutions were prepared as before, and the amount of bone phosphate and of nitrogen determined in each, when the following results were obtained:—

Table showing the amount in grains of Bone-phosphate dissolved in 1 *gallon of Water left in contact with Rotten Bones for* 24 *hours in the proportion of* 500 *grains of Bones to one decigallon of Water.*

		Bone-phosphate.	Nitrogen	=	Ammonia.
Rotten bone-dust ..	1st solution ..	20·30	28·70	=	34·85
	2nd „ ..	10·50	4·90	=	5·95
	3rd „ ..	6·30	3·50	=	4·25

In comparison with all the other varieties of bone manure the rotten bones, it will be seen, yielded a very considerable proportion of phosphate of lime to cold water; thus furnishing another direct proof that bone-dust in a decomposed condition is much more efficacious and quick in acting than fresh bones.

Boiling water, I find, dissolves a still larger amount of phosphate of lime than cold, as will be seen from the following experiment, in which rotten bones in a far advanced state of putrefaction were employed.

100 grains of such rotten bone-dust were boiled out with 10 ounces of water; the liquid produced was filtered perfectly clear, evaporated to dryness, and the amount of phosphate in the heated residue determined as before.

The 100 grains gave 2·27 grains of soluble phosphate of lime. A gallon of bone liquid, produced in this way, consequently will contain as much as 36·32 grains of bone-phosphate. The insoluble portion of the bone was boiled out a second time with 10 ounces of water. The resulting clear liquid was found to contain ·49 of a grain of phosphate, or one gallon would contain 7·89 grains, showing that with the first reduction of the ammoniacal and nitrogenous compounds the solubility of the phosphate of lime became greatly diminished.

The rotten bone-dust used in this experiment had in 100 parts the following composition:—

Moisture	21·55
*Organic matter	18·52
Phosphates of lime and magnesia (bone-earth) ..	39·24
Carbonate of lime and common salt	19·14
Sand	1·55
	100·00
*Containing nitrogen	1·82
Equal to ammonia	2·21

Ordinary bone-dust does not, or ought not to, contain more than 1 to 1½ per cent. of alkaline salts; sometimes, however, common salt, or a strong solution of brine, is added with a twofold object in view—to increase by a cheap admixture the weight of the bone-dust; and to arrest or prevent fermentation, which readily sets up when moist bones, especially those from which most of the grease has been boiled out, and which are kept in a heap. Fermentation is always accompanied by elevation of temperature and partial destruction of all organic matter. A heap of fermenting, or more correctly speaking putrefying, bone-dust heats more or less strongly; and besides the gases arising from the destruction of organic matter, throws off a good deal of water in the shape of invisible vapour. The loss in weight sustained by keeping ordinary bone-dust in a heap for a period of 3 or 4 months, according to its condition, generally amounts to from 12 to 18 per cent. Salt, as is well known, acts as a check to fermentation and keeps the heap moist. In the sample of rotten bone-dust used in the last-named experiment I found a good deal of salt, which appears to have been mixed with it for the purpose just referred to.

It may be suggested that the large amount of phosphates in the watery solution of the last sample may have been due to the presence of common salt. Direct experiments, however, have shown me that the phosphates in bones are not rendered more soluble in water by its agency. As the negative results ob-

tained by me by digesting various forms of bone-dust with salt solutions have no special interest, I content myself by mentioning only two or three which give as good a proof in support of the opinion just expressed as that afforded by the whole series.

500 grs. of fine hard bone-dust and 200 grs. of salt were mixed with 1 decigallon of water, and the phosphate dissolved by the saline liquid afterwards determined.

Under the same circumstances as those in which pure water dissolved 2·80 and 2·10 grains of bone-phosphate per gallon, salt solutions took up 2·10 and 2·40 grains of bone-phosphates respectively, or almost precisely the same quantities as pure water.

I may mention in passing that lately a peculiar description of bone-dust has been seen occasionally in the manure market. It is imported from Belgium, and sold as prepared Belgian bones. It is very brittle, generally rather damp, emits a strong ammoniacal smell similar to that of rotten cheese, and appears to be a refuse obtained in the manufactory of gelatine or some such substance. Prepared Belgian bones, like English glue-makers' boiled or refuse bones, when dry are readily ground into a fine powder, which though not so valuable as fine ordinary bone-dust for manure, may nevertheless be used with advantage both for root crops and for pastures.

Three samples analysed by me a short time ago had the following composition:—

Composition of Three samples of prepared Belgian Bones.

	I.	II.	III.
Moisture	22·66	16·49	27·73
*Organic matter	10·12	11·40	8·81
Tribasic phosphate of lime (bone-earth)	56·94	60·84	51·32
Carbonate of lime and alkaline salts	9·49	10·05	11·16
Sand	·79	1·22	·98
	100·00	100·00	100·00
*Containing nitrogen	1·14	1·28	·86
Equal to ammonia	1·38	1·55	1·04

Sample No. II. is by far the best of the three, for it contains less moisture, and more nitrogenous matter and phosphates than the other samples.

A still more valuable bone preparation than the preceding may be obtained in works in which patent size is made, not by boiling out the gelatine, but by dissolving the mineral portion of bones by means of cold diluted hydrochloric acid, and leaving the gelatinous tissue of bones behind.

In works wherein this plan is adopted large quantities of an

acid liquid, essentially a solution of bone-phosphate in hydrochloric acid, are obtained. By adding slaked lime or carbonate of soda until the free acid is neutralised, the phosphates fall down as a white voluminous precipitate, which after subsidence may be collected, partially washed, and dried on a hot plate. When carefully prepared in this way, precipitated bone-phosphates constitute a very valuable fertilising material, which is readily assimilated by plants.

A reference to experiments given in preceding pages will show that, in a precipitated state, phosphate of lime is far more easily soluble in water, and more efficacious as a manuring agent than in the shape of phosphatic minerals, bone-ash, or even fine bone-dust.

When moderate care and skill are employed in the manufacture of precipitated phosphates, an exceedingly light, dry, and very valuable white powdery substance containing from 78 to 80 per cent. of pure tribasic phosphate of lime can be obtained.

Generally, however, workmen add more lime to the acid liquid than is necessary to precipitate the phosphates, and the excess of lime falls down with the precipitate and afterwards gets changed into insoluble carbonate of lime, which remains mechanically mixed with the phosphates.

The addition of slaked lime to the acid liquid, I need hardly say, produces chloride of calcium, which remains in solution. The liquid containing this very deliquescent salt is seldom removed as perfectly as it might be from the precipitated phosphates. Prepared on a manufacturing scale the bone precipitate generally contains some carbonate of lime with more or less chloride of calcium, moisture, and water of combination. It is sold in commerce as bone-flour, and varies much in composition, and consequently in value, as will be seen by glancing at the subjoined analysis:—

Composition of two samples of Bone-flour (precipitated Bone-phosphates).

	I.	II.
Moisture and water of combination	30·20	22·51
*Phosphoric acid	23·83	30·50
Lime	34·52	40·65
Magnesia, chlorine, &c.	9·92	6·15
Sand	1·53	·19
	100·00	100·00
*Equal to tribasic phosphate of lime (bone-earth)	52·04	66·58

In a third very inferior sample I determined separately chlorine, carbonic acid, phosphoric acid, lime, &c. Uniting the constituents found in the compound, its composition may be stated as follows:—

Composition of a sample of inferior Bone-flour (Commercial precipitated Bone-phosphates).

Moisture (loss at 212° F.)	16·87
Organic matter and combined water	5·01
Tribasic phosphate of lime	36·28
Carbonate of lime	4·65
Chloride of calcium	31·72
Insoluble siliceous matter (sand)	5·47
	100·00

Chloride of calcium is a very deliquescent salt, which is injurious to vegetation, and therefore ought not to occur in so large a proportion as it did in this sample.

An excellent artificial manure for root-crops may be obtained by mixing together 3 parts of prepared precipitated bone-phosphate with 3 parts of Peruvian guano. Applied at the rate of 4 cwts. per acre, the mixture will be found especially useful for root-crops intended to be grown on light land.

Equal parts of precipitated bone phosphate (of a good sample), Peruvian guano and common salt, and applied at the rate of 8 to 9 cwts. to the acre form a capital dressing for permanent pasture.

Summary.

The chief points of interest embodied in the preceding pages may be briefly summarised as follows:—

1. Pure and dried phosphate of lime is sparingly soluble in water.

2. In a moist state and the voluminous condition in which it is obtained by precipitation from its solution, it is about four times as soluble in water as it is after it has been dried and heated.

3. Ammoniacal salts added to water materially increase the solubility of pure phosphate of lime, and of the phosphates in bone-ash, coprolites, and other phosphatic minerals.

4. Nitrate of soda and common salt neither increase nor diminish the solubility of phosphates in water.

5. Bone-ash is not sufficiently soluble in water to be used with advantage by itself or mixed with other fertilising matters as a manure.

6. The earthy phosphates in Peruvian and phosphatic guanos, still containing a good deal of organic matter or salts of ammonia, are sufficiently soluble in water to be readily appropriated by plants.

7. The phosphates contained in coprolites, apatite, Sombrero rock, Spanish phosphate, and other phosphatic minerals, especi-

ally when they are hard and crystalline, are very little acted upon by water.

8. For agricultural purposes, phosphatic minerals as well as bone-ash should be treated with a quantity of sulphuric acid sufficient to convert the whole of the insoluble phosphates therein contained as completely as possible into soluble combinations. It is a waste of good raw material to leave much of the insoluble phosphates unacted upon by acid.

9. Insoluble phosphates present in superphosphate, or similar artificial manure, have little or no practical value to the farmer.

10. The different kinds of bone-dust vary much in their solubility and practical efficacy as manures.

11. Bone-dust made from solid bones, even when reduced to a fine powder, is less soluble in water and acts more slowly on vegetation than much coarser bone-dust made from porous or spongy bones.

12. Fresh bones impregnated with grease do not readily enter into decomposition, and are less valuable as a manure than bones from which most of the fat has been removed by boiling in an open copper.

13. Fat or bone-grease has no fertilising value whatever, and as it retards the solution of bone-dust in water, it is decidedly an objectionable constituent of fresh bones, as far as the agriculturist is concerned.

14. Water dissolves much more phosphate of lime from rotten than from fresh bones.

15. During the putrefaction of bones, soluble nitrogenous organic compounds and ammoniacal salts are produced from the gelatine contained in bones. These compounds act powerfully and quickly as fertilising constituents, and are indirectly useful in greatly enhancing the solubility of bone-phosphates in water.

16. Bone-dust kept in a heap for a period of 3 or 4 months, heats and becomes more efficacious as a manure than bone-dust applied to the land fresh from the mill.

17. Ivory-dust (or bone-shavings) is frequently adulterated with gypsum, fine sand, or vegetable ivory, but when genuine is the best form in which bone can be used for the production of home-made superphosphate.

18. High-pressure steam renders bones so brittle that they can be readily ground into a fine powder, which is readily assimilated by plants.

19. Bone-meal prepared by high-pressure steam contains not much less nitrogen than ordinary bone-dust, and as a manure is far more efficacious and valuable than the latter.

20. Placed in a heap with ashes or sand, and occasionally

moistened with liquid manure or water, bone enters into putrefaction, and becomes a much more soluble and energetic manure than ordinary bone-dust.

An excellent way of rendering bone-dust soluble, it may also be mentioned, is the Norfolk plan of putting it in alternate layers between fresh farmyard-manure, and letting both ferment together in a conical heap, covered up with earth to prevent the loss of any fertilising matter, and to secure it from penetration by heavy rains.

Laboratory, 11, *Salisbury-square*, *Fleet-street*,
February 1*st*, 1868.

XI.—*Report on the Trials of Fixed and Portable Steam-Engines at the Bury St. Edmund's Meeting*, 1867.

The following Report was received by the Stewards of Implements at the Bury St. Edmund's Show too late to be inserted in the last Journal.

To the Council of the Royal Agricultural Society of England.

My Lords and Gentlemen,—We have the honour to hand you our Report of the Trials of Fixed Steam-Engines and of Portable Steam-Engines at the Meeting of the Society held at Bury in July last.

Fixed Steam-Engines.

We awarded the First Prize to Messrs. Clayton, Shuttleworth, and Co., who exhibited an engine well designed and thoroughly well made, which showed a very low consumption of fuel. The cylinder was steam-jacketed, and the jacket was in full use during the trial, although, from the relative positions of the Society's boiler and the engines to be tried (it not being possible to run the condensed steam from the jacket back to the boiler), the water was suffered to escape.

The Second Prize was awarded to Messrs. Tuxford and Sons. This engine also had a steam-jacketed cylinder, and was in other respects well designed and very well made; but during the trial the steam was not kept on the jacket, and we believe that this had the effect of increasing the amount of steam used.

The Engine of the Reading Iron Works Company we highly commended, as in its consumption of fuel it was but little above that of Messrs. Tuxford, and the workmanship was very good. This engine was furnished with a means of varying the expansion without stopping the engine. This is an extremely valuable adjunct to an engine when it is in charge of an intelligent driver.

We commended the Oscillating Engine of Messrs. Deacon and Wood, because, although a very cheap engine, it gave a very good result as to consumption of fuel.

As regards the *Portable Steam-Engines*, whether single or double cylinder, these, so far as noticed in our Award sheets, were put through a double trial, the second being at 50 per cent. of load in excess of the first.

Single Cylinder Portable Engines.

In this class we awarded the First Prize to Messrs. Clayton, Shuttleworth, and Co., who produced a thoroughly well designed and well made engine, which did its work with an extremely small consumption of fuel.

The Second Prize we awarded to Messrs. Tuxford and Sons, whose engine was also extremely well made and designed, and who gave proof of an economy but little below that of Messrs. Clayton, Shuttleworth, and Co.

The Reading Iron Works Company's Engine we highly commended. It was extremely well designed and well made. This engine was fitted with a means of varying the expansion, similar to that employed in the fixed engine by the same makers. See our remarks thereon.

We also highly commended the Engine of Messrs. Brown and May, because it gave, without any separate expansion valve, a very good economic result. It was a very plain, serviceable engine.

Of the Double Cylinder Portable Engines four only were tried twice.

The First Prize was given to Messrs. Clayton, Shuttleworth, and Co., whose Engine, well designed and well made, worked with great economy.

The Second Prize was given to Messrs. Ransomes and Sims, whose Engine was of extremely good workmanship, and gave a performance in respect of coal differing but by a small fraction of a pound from that given by Messrs. Clayton, Shuttleworth, and Co.

The Engine of Messrs. Tuxford and Sons well deserved the high commendation we gave it, although we could not lose sight of the fact that its price was higher than that of its competitors.

The Engine of Messrs. Brown and May we highly commended, because, as in the case of their single engine, it was of a plain, serviceable class, and yet gave a very good result.

We have the honour to be, my Lords and Gentlemen,

Your obedient servants,

John V. Gooch,
F. J. Bramwell,
Jas. Easton,
Judges of Steam-Engines.

London, November 7, 1867.

To the Senior Steward of Implements at the Bury Show of the Royal Agricultural Society of England.

My Lord,—We have the honour to submit for your Lordship's consideration and that of the Council some recommendations as to the preparations for and conduct of the trials of steam engines in future years, which are prompted partly by the difficulties experienced this year, and the consequent delay of our award and also of our report; and partly by the consideration of the fact, that the circumstances under which the trials take place, although affording results which are for many purposes very valuable, do not correspond with the circumstances under which an engine would be worked by a purchaser.

The Fixed Steam Engines (as you are aware) are supplied with steam from a boiler belonging to the Society, but attended to by the workmen employed by each exhibitor. Although there is not any clause forbidding the exhibitor to heat the feed-water supplied to this boiler, nevertheless, there seems to have been an understanding among them that this should not be done; we think it would be well if it were stated in the "conditions" hereafter to be published, that the exhibitors will be allowed to apply any feed-water heater that

they think fit, so long as such heater derives its heat from the exhaust steam only, and so long as the heated water can be brought to the feed-pumps supplied by the Society. Our object in making this suggestion is to do away with the anomaly that now exists between the performance of the fixed engines and the portable engines—an anomaly largely due to the fact that nearly the whole of the portable engines use feed-water heaters, while the fixed engines do not use them upon their trials."

It will be in your recollection that on this occasion two trials were directed to be made with each portable engine. The first with the load equivalent to the nominal power of the engine; the second with the load corresponding to a power 50 per cent. in excess of the first.

We find the relative results of these trials (except in one or two cases, for which we can partly account) to be so nearly alike, that we think only one trial in respect of load need in future be made, such trial to be either with the ordinary load or the excess load, as may be decided by the Council.

At this trial we think it should be made a condition that only one man should be allowed to attend to the fire, the oiling, the feed-water, the preparation of the coal (*such preparation to be made while the engine is running*), in fact, to attend to the whole work of the engine.

At the present time we have seen as many as six men engaged in attending one engine; viz., one man breaking the coals into pieces the size of small walnuts, another man putting these pieces on to the fire with a shovel like a money-scoop, another man oiling the cylinders, another oiling the bearings, another putting the feed-water into the heater by ladlefuls at a time, and another ready for any odd job that might arise. This clearly is a condition of things that could not exist in ordinary work, and we therefore think it most desirable that in trials also made with portable engines, the whole attendance for each engine should be done by one man.

At the same time we think it important for instruction to engine-makers and to purchasers that the very best results to be obtained in reference solely to consumption of fuel should be known, and we therefore are of opinion that each exhibitor should be allowed to have a second trial at which he might employ (as he now does) as many men as he pleases. It is clear that time will not admit of three trials being made, two trials are the utmost that can be attempted; and we are of opinion that more useful results will be obtained by the course we have ventured to suggest than by continuing the two trials at different loads as at Bury.

We are also of opinion that it would be an extremely easy matter to make provision for taking accurately the amount of water evaporated by each boiler during the trial of its engine, and thereby to arrive at how much of the result was due to the boiler and how much to the engine. We are aware, it may be said, that the only thing in which the purchaser is interested is the final result of work done by the engine for the coals consumed, and that he is not interested in the steps by which this result is reached; but we are of opinion that this is a very narrow view to take, and that the purchaser is the person, above all others, interested in such details of information as are necessary to enable makers of engines to discover the points which need correction, and thus to keep up progressive improvements in the amount of work done for a given quantity of fuel.

We also recommend that all brakes intended to be used should, previously to the trials, in addition to being put into perfect working order, be actually worked to a sufficient extent to overcome the effects of standing idle.

Each brake should have appointed to it an intelligent man, thoroughly capable of working and regulating it with certainty.

As soon as it is known what number of engines are intended for trial, the time necessary to make the trials should be precisely estimated, taking into

account the number of brakes to be used; and the Judges should so begin the trials as to ensure their being completed by the evening of the Friday before the show opens, and thus ensuring for themselves time on the Saturday carefully to consider the results and make their awards, so that the exhibitors may have them on the first day of the show.

The water tanks should be placed at a height of not less than 10 feet above the level of the trial platform, and the hose-pipes and all outlets should be not less than 2 inches inside diameter, and should be proved all tight and secure.

With respect to the printed "conditions" of trial, we think that—

Each boiler should be fitted with check-valve for the feed-water in addition to the two pump-valves specified in Clause 9.

Clause 13. The examination should be made at such time and in such manner as the Judges may determine.

"SPECIAL ARRANGEMENTS."

Clause 4 should follow Clause 7, and read "his own driving strap" for each description of engine. Several exhibitors at the Bury Show appeared to be under the impression that the Society provided straps for portable engines.

Clause 8. Is not the first week in July much too near the time of trial to allow the necessary arrangements to be perfected?

Clause 9 we think should be modified as follows:—All the fixed engines intended for trial must be fixed in their places according to the order of trial on the trial platform by a given time, viz. by the of , and strictly in the position and under the conditions required; and all portable engines must be placed (so far as the allotted space will allow) also in the order of trial: and those for which there is not room on the platform must be drawn up in front of it not later than the evening of the day above-named.

We have the honour to be, my Lord, your obedient servants,

JOHN V. GOOCH.
F. J. BRAMWELL,
JAS. EASTON,
Judges of Steam Engines.

November 7, 1867.

XII.—*Statistics of Live Stock and Dead Meat for Consumption in the Metropolis.* By ROBERT HERBERT.

NOTWITHSTANDING that the importations of foreign stock into the United Kingdom during the last six months of 1867 were considerably less than in the corresponding period in 1866, a rather heavy fall took place in the quotations; so that both beasts and sheep have now declined to about their average value. Several causes have operated seriously against price:—viz., the unusually prime condition in which the stock has made its appearance from nearly the whole of our grazing districts; the great increase, both here and on the continent, in the slaughter of animals destined for consumption in the metropolis; and the restrictive measures in reference to the removal of

beasts without the four-mile radius. Those measures have been much cavilled at by the trade in general; but so long as there is a possibility of a fresh outbreak of disease, they will be continued. The supplies derived from the continent—about 20,000 tons—were mostly disposed of at moderate currencies. The total number of beasts exhibited and disposed of in the metropolitan market was 138,520 head, against 148,320 head in 1866; 181,400 in 1865; 177,944 in 1864; and 168,232 head in 1863. Lincolnshire, Leicestershire, and Northamptonshire, forwarded 7510 more bullocks than in the previous corresponding season. The increase from Norfolk, Suffolk, Essex, and Cambridgeshire, was 1800; from other parts of England 240, from Scotland 321, and from Ireland 1472 head. The latter, however, were mostly in very poor condition—the selling price having been only from 6*l.* 10*s.* to 10*l.* each. As regards the progress of crossing, it may be observed that nearly the whole of the beasts from Scotland were crosses between Shorthorns and Ayrshire cows. Their quality was unexceptionably good. Judging from the large number of pure breeds on sale from our various grazing districts, the crossing system does not appear to be on the increase in England.

The supplies of sheep brought forward in 1867 were 694,500, against 708,260 in 1866 and 769,814 in 1865. The deficiency in number was made good by the improved weight and condition of most breeds on sale. Throughout the six months the trade was in a most unsatisfactory state, and prices gradually gave way, until at one time the highest value of the best Downs and crosses did not exceed 4*s.* 10*d.* per 8 lbs. In 1866 that description of stock sold at 6*s.* 6*d.* per 8 lbs.

The few calves on sale commanded very full prices—viz., from 4*s.* 4*d.* to 5*s.* 10*d.* per 8 lbs.

Although the supply of pigs was only moderate, the pork trade was heavy, at low prices—viz., from 3*s.* 4*d.* to 4*s.* 2*d.* per 8 lbs. These quotations, owing to the high price of meal, potatoes, &c., were very unremunerative to the breeders and feeders.

The total numbers of stock exhibited in the six months were:—

	Head.
Beasts	138,520
Cows	1250
Sheep	694,500
Calves	10,423
Pigs	14,034

In the seven previous seasons these were:—

	Beasts.	Cows.	Sheep and Lambs.	Calves.	Pigs.
1860	145,420	3015	762,740	15,766	15,470
1861	149,750	3187	774,260	12,441	20,116
1862	159,450	3148	759,671	12,579	18,220
1863	168,232	3127	761,070	14,822	17,550
1864	177,944	3221	769,814	17,967	19,306
1865	181,400	2177	890,160	21,532	16,151
1866	148,320	2000	708,260	12,291	17,480

The district bullock supplies, including Ireland and Scotland, in the last six months were:—

District Bullock Arrivals.

	Northern Districts.	Eastern Districts.	Other parts of England.	Scotland.	Ireland.
1860	66,140	9,500	20,500	1,151	7,852
1861	71,450	2,500	9,700	4,586	14,340
1862	74,570	5,050	19,620	3,307	14,820
1863	66,510	3,850	21,250	3,213	11,280
1864	60,350	8,400	19,400	3,625	7,079
1865	52,270	1,600	20,070	4,512	5,011
1866	35,900	2,700	16,340	1,844	4,170
1867	43,410	4,500	16,580	2,165	5,642

The total imports of foreign stock into London in the last six months of 1867 amounted to 289,124 head, against 378,875 in the corresponding period in 1866, 557,875 in 1865, and 362,709 in 1864. At the outposts the arrivals fell off considerably. The heavy fall in the value of both beasts and sheep, but more particularly in the latter description of stock last year, prevented the usual number of animals being shipped from the continent. Although the supply diminished, the general quality of the stock exhibited signs of great improvement. The comparison of prices stands thus:—

Average Prices of Beef and Mutton.

BEEF.—Per 8 lbs. to sink the Offal.

	1863.	1864.	1865.	1866.	1867.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Inferior ..	3 4	3 6	3 2	3 6	3 2
Middling ..	4 2	4 6	4 6	4 8	4 4
Prime ..	5 0	5 6	5 4	5 4	4 10

MUTTON.—Per 8 lbs. to sink the Offal.

	1863.	1864.	1865.	1866.	1867.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Inferior ..	4 0	4 2	4 6	4 0	3 2
Middling ..	5 0	5 2	5 6	5 2	4 2
Prime ..	5 10	5 10	6 8	6 2	4 10

Imports of Foreign Stock into London in the last Six Months of 1867.

From	Beasts.	Sheep and Lambs.	Calves.	Pigs.
Aalborg..	201	72	..	..
Amsterdam	34	2,837	19	..
Antwerp	213	15,935	1,341	40
Barcelona	306	..	..	..
Boulogne	455	95	27	..
Bremen..	3,228	3,917	197	..
Cadiz	911	..	..	..
Caen	132	..	9	..
Corunna	538	..	..	..
Dieppe	337	..	16	..
Dunkirk	..	9	68	16
Gerstemunde	2,069	2,974	76	..
Gibraltar	755	..	..	..
Gothenburg	1,655	284	473	..
Hamburg	4,061	27,162	13	749
Harburg	306	2,701	43	343
Harlingen	7,349	45,138	2,058	10,774
Harlingen and Meive Diep	344	8,648	121	933
Hoppaus	176	362	..	..
Königsberg	134	70	..	..
Lisbon	3	..	1	..
Medleublik	..	31,015	3	..
Moerdyk	284	1,593	411	..
Meive Diep	418	25,172	..	..
Oporto	1,461	..	..	..
Ostend	319	1,359	214	..
Randers..	544	130	..	..
Randers and Aalborg	252	270	166	..
Rotterdam	297	1,668	112	8,048
Seville	476	..	..	..
St. Petersburg	103	..	..	..
Tonning	34,471	28,677	1	..
Tronville	578	..	..	..
Vigo	354	..	..	..
Total	62,764	200,088	5,369	20,903

Imports at Corresponding Periods.

	Beasts.	Sheep and Lambs.	Calves.	Pigs.
1860	59,817	243,804	19,594	21,510
1861	59,049	266,249	19,715	25,919
1862	57,356	250,140	19,610	17,279
1863	61,435	241,209	17,497	18,936
1864	76,922	238,121	16,793	30,803
1865	88,775	399,220	19,535	50,445
1866	92,839	251,545	14,544	19,252

Rough fat was abundant and low in price—the average quotation having been 2*s.* 2*d.* per 8 lbs.

Newgate and Leadenhall markets were heavily supplied with meat. The trade generally was very inactive. Beef sold at from 3*s.* to 4*s.* 6*d.*; mutton, 3*s.* 2*d.* to 4*s.* 6*d.*; veal, 3*s.* 10*d.* to 4*s.* 8*d.*; pork, 3*s.* to 4*s.* 4*d.* per 8 lbs. by the carcase.

The production of wool in England in 1867 was very large—viz., 125,000,000 lbs. or 18,000,000 lbs. more than in 1866. This heavy growth, added to enormous importations from our colonies, had a most depressing influence upon the trade. Prices fell from 2*d.* to 3*d.* per lb., with every prospect of a further decline in them, as we learn that the last clip in Australia and at the Cape was considerably in excess of 1866. The high duties upon wool and woollen goods in America tell seriously against the trade as a whole. In order to show the extent of the arrivals, we insert the annexed return of importations in the last five years:—

	1867.	1866.	1865.	1864.	1863.
	Bales.	Bales.	Bales.	Bales.	Bales.
Australian	412,641	348,628	332,560	302,177	241,630
Cape of Good Hope ..	128,418	107,184	99,991	69,309	68,922
East India	47,010	79,732	54,228	58,909	64,458
German	15,865	40,475	24,696	32,684	31,853
Spanish	2,770	716	876	3,419	1,305
Portugal	8,135	14,205	12,685	8,258	6,935
Russian	21,258	45,021	37,147	37,829	34,693
Sundry	149,703	154,497	123,451	158,122	145,530
Total	785,800	790,458	685,634	670,707	595,326

The closing prices of wool in 1866 and 1867 were as under:—

	1866. Per lb.					1867. Per lb.				
	s.	d.		s.	d.	s.	d.		s.	d.
Fleeces:—										
Southdown hoggetts	1	6½	to	1	7	1	2	to	1	2½
Half-bred hoggetts	1	7½	to	1	8½	1	2½	to	1	3½
Kent fleeces	1	7	to	1	8	1	1	to	1	1½
Southdown ewes and wethers	1	4½	to	1	5½	1	1	to	1	1½
Leicester ditto	1	6	to	1	7	1	1	to	1	2
Sorts:—										
Clothing picklock	1	7½	to	1	9	1	5½	to	1	6
Prime	1	6	to	1	7	1	4½	to	1	5
Choice	1	5½	to	1	6	1	3½	to	1	4
Super	1	4½	to	1	5	1	2	to	1	3
Combing:—										
Wether matching	1	8	to	1	8½	1	5	to	1	5½
Picklock	1	5½	to	1	6½	1	2½	to	1	3½
Common	1	3½	to	1	4	1	0	to	1	1
Hog matching	1	10½	to	1	11½	1	5	to	1	5½
Picklock matching	1	7	to	1	7½	1	2½	to	1	3½
Super ditto	1	4½	to	1	5	1	0	to	1	1

It will be seen from the above comparison that the decline in prices since 1866 has been unusually severe, but our impression is that, although possibly continental houses will be large buyers of wool this year, there is very little room for any important upward movement in the quotations. Production has evidently overtaken the power of consumption.

4, *Argyle Square, St. Pancras.*

XIII.—*Prizes to Engine Drivers. A Letter addressed to the Editor, by* W. Wells.

Sir,—If you have a page to spare in the Journal, I think the success which, at the four last meetings of our Peterborough Agricultural Society, has attended the allotment of a Prize to Drivers of Agricultural Portable Steam Engines, deserves to be recorded.

I had long thought that the growing importance of the position of these men in the agricultural world required to be recognised, their careful services encouraged, and their interest in the mechanical details of their duties stimulated. I had not heard of any instances of special prizes being open to them, and I determined therefore, in 1864, to offer through the medium of our Association a prize of 10*l.*, to which the following conditions, drawn up after careful consideration by a Committee, were attached.

ENGINE DRIVERS.

	£.	s.	d.
Class 6. To the Driver of an Agricultural Portable Steam Engine who shall have shown the greatest skill, care, and competence in the management of the Engine, of which he shall have had charge not less than 18 months, the sum of	6	0	0
To the second in merit as above	4	0	0

Entries to be made on or before the 5th of May.—Blank Forms can be obtained of the Secretary.

It will be necessary that the Owner of the Engine shall certify:—

1st. That during the time that the competitor has been in his service, no accident whatever, either to property, life, or limb, has occurred to or with the Engine, through his neglect.

2ndly. That he is quite satisfied with his management and care of the Engine, and that he can testify to his character for sobriety and general good conduct.

The above considerations are chiefly to guide the Committee or Judges in making their awards, but they are empowered to employ a competent practical Engineer or Inspector. The person taking the first prize not to be eligible again for three years, and no competitor to take the second prize twice.

Many considerations had to be borne in mind in settling the above conditions. Besides special ability shown as an engine driver, it seemed desirable that in the case of each competitor, length of service, care of his master's property, and general good conduct should have their due weight, while the varying circumstances connected with each engine should also be taken into account. The certificate alluded to, which has to be filled up by the employer, is in the following form:—

PETERBOROUGH AGRICULTURAL SOCIETY, 186 .

Certificate.

I of in the county of hereby recommend to compete for the prizes in Class 5, and I declare him qualified to do so, according to the rules and restrictions of the Society.

Dated this of 186 .

The following Questions to be answered by the employer:—

Questions.	*Answers.*
1. How long has lived consecutively in your service as engine driver?	
2. Had you a satisfactory character from his previous employer?	
3. For what length of time was he employed as engine-driver by him?	
4. Are his habits strictly sober?	
5. Is his general conduct satisfactory?	
6. Are you satisfied with his general management of your engine and machine?	
7. Is he particular in keeping his engine and machine clean?	
8. Is he capable of doing small repairs?	
9. Has any accident whatever occurred to or with the engine, either to property, life, or limb, through his neglect since he has been in your service?	

I hereby certify to the correctness of the above certificate.

(Signed)

From the certificate, the length of service of the competitor and his general conduct can be ascertained. There remain, 1st, his special competence as an engine driver to be tested; and 2ndly, his care of his engine to be proved by inspection, due allowance being made for its original cost, its age, and wear and tear.

To arrive at a satisfactory conclusion as to the merits of the candidates on these two points, it was determined that some engineer of experience should be found to act as Examiner and Inspector, and that after his examination and inspection he should give in his report to the Committee: who then, considering it in connexion with the respective certificates of service and general conduct, would be enabled to award the prizes.

These were the conditions of the first competition in 1864, and no alteration has been made in them since.

The examination of the engine drivers is carried on in the following manner. On the appointed day the competitors having been duly entered and furnished with certificates by their employers, appear in the yard at the back of the manufactory of Messrs. Amies and Barford. Here are standing ready two agricultural steam engines, one in good working order, the other out of repair. The men are drawn up at the end of the yard, and the Examiner having summoned them one by one at a time to where the engines are standing, examines them in any way which seems to him best calculated to test their competency.

Of course very considerable tact and judgment is necessary on the part of the Inspector, a *vivâ voce* examination being an ordeal, under which a rustic labourer—and many drivers of agricultural steam engines are only ordinary labourers—would be peculiarly liable to break down. A few simple questions are put to them, they are perhaps asked to show their power in stoking, or inquiries are made as to what they would do under certain hypothetical emergencies, or again, they may be begged to point out what is wrong, and how they would remedy the wrong, in the engine out of repair. In the end, by marks or otherwise, the Examiner arrives at a conclusion—necessarily rather roughly formed—as to the order of merit in which the men have proved their acquaintance with the art of engine driving.

Previous, however, to the day of competition, the inspection of the engines at their respective homes has taken place by the examining engineer, who, choosing his own time, and giving no notice of his coming, visits in turn all those engines of which the drivers have been entered as competitors.

Here again much judgment must be exercised, and in apportioning credit to the men for the state their respective engines

are found in, all the varying circumstances of each must be carefully considered and balanced.

The result then of the examination of the competitors on the one hand, and of the inspection of the steam engines on the other hand, form the ground of the examining engineer's report to the Committee, who, however, before awarding the prizes, reserve to themselves the power of further considering the claims of the competitors in connexion with their certificates.

We have been very fortunate in hitherto obtaining the voluntary assistance of a gentleman connected with the engineering department of the Great Eastern Railway, who has given us in the kindest manner his services as Examiner and Inspector gratuitously. On an average in the four years, the number of engines to be inspected has been 20, of these it is practicable to inspect 5 or 6 in one day, and at little cost to the Society, as one of the Committee, or some friend to the Association, has generally been found public-spirited enough to provide a conveyance for the Inspecting Engineer on his round of visits.

There seems a general impression in the neighbourhood, that since the prize has been started a marked improvement has taken place in the intelligent interest the men show in the care and working of their engines. The entries have increased each year; although, as our Association does not extend over a wide area, they cannot be expected to increase greatly beyond their present number.

One cannot read of the lamentable, and too often fatal accidents with agricultural steam engines, without remarking how often these casualties occur through the ignorance, as well as carelessness of the drivers. It cannot therefore but be most desirable to do something to promote among them a more enlightened knowledge of their duties—something which will encourage them to work with their brains, as well as by the rule of thumb, and it is because I believe that the prize given by our Association is really doing much in this direction, and because I wish they were more general throughout the country, that I send you these few lines, in case you may like to insert them in the next number of the Journal.

I am, Sir, faithfully yours,

W. Wells.

Holme Wood, Peterborough.

XIV.—*On the Use of Home-grown Timber when prepared with a Solution of Lime.* A Letter addressed to the Editor by ARTHUR BAILEY DENTON.

DEAR SIR,—The abuse of home-grown timber in its application to farm buildings having led the Enclosure Commissioners of England and Wales to state in their memorandum of instructions to persons using the powers of the Improvement Acts, that "in all cases where fir timber is used, that obtained from Memel or Norway, and battens from Dram, St. Petersburg, or other Norway or Baltic ports, is to be preferred," the importance of their recent decision with respect to home-grown timber, after it has been prepared by being steeped in a solution of lime, cannot be overrated; inasmuch as, not only may the cost of farm buildings be reduced by its judicious employment, but the growth of suitable timber on soils which might otherwise remain unproductive will be encouraged. Thus, two branches of estate improvement greatly affecting the interests of landowners may be advantageously promoted.

In the month of March, 1867, Mr. Burton Borough, of Chetwynd Park, near Newport, Salop, applied to the General Land Drainage and Improvement Company for the use of the powers of their Act in the erection of certain farm buildings, and carrying out certain other improvements; at the same time expressing his intention of using the fir timber grown upon his estate where it could be profitably applied; and desiring an investigation into the system he was then adopting of steeping the timber he used, after it had been sawn by steam machinery to the proper scantlings, in a solution of lime. An investigation of the process satisfied my father, acting on behalf of the Company, that the object was not only desirable in this particular instance, but that it might be found advantageous in the majority of cases where suitable timber was growing on estates. For many years the process of soaking fir timber of mature growth in a solution of lime had been adopted on the Chetwynd estate, and specimens of timbers used in the roofs of buildings upwards of a quarter of a century ago, exhibiting an absence of all decay from fungoid action or animal destruction, having been laid before the Enclosure Commissioners, they intimated their disposition to accept with equal readiness home-grown timber so prepared, or foreign timber as ordinarily used, if the trees selected for the purpose appeared suitable and of sufficient age, to their inspector, Mr. C. Selby Bigge. Such being found to be the case, Mr. Bigge reported accordingly; and as he has taken great interest in the matter, it is to be hoped he will

be induced to favour the Society at no distant period with his views on the subject.

In the meantime I trouble you with a few remarks in order that those who are in a position to profit by the decision may be induced to give their early attention to the matter.

We have long been in want of a cheap and generally applicable mode of rendering timber more durable, either by expelling the sap and filling up the pores of the wood with substances of a less changeable and destructive nature, or by so neutralising the effect of the sap and altering its character as to produce the same result.

Sap, it is well known, is the first and most powerful cause of decay in timber, since the fermentation of its albuminous compounds is the cause of the production of cryptogamic, or fungoid vegetation, and the deposit of the eggs of zylophagous insects. Sap, also, is the primary cause of dry rot, for it is the putrefactive fermentation of sap which affects in the first instance the woody fibre, and inducing decomposition, causes that entire destruction of the whole substance of the timber which too often brings about the worst results.

Many methods of preventing these evils or arresting the progress of decay have been proposed. Some of them have for their object the destruction or evaporation of the sap, and the consequent closing up or hardening of the woody fibre. Others are designed to attain the same result by the destruction of the albuminous constituents of the sap, or by forming insoluble precipitates with metallic salts. To attain the first of these objects, viz., the destruction or evaporation of the sap, heat, obviously is the readiest agent, and from the earliest ages it has been a common practice to char the ends of timbers intended to be exposed to the action of damp or alternation of temperature. Several improvements upon this expedient have been proposed. Amongst others, I may mention the process of smoking timber in a drying-stove, recommended by a French authority named Guilbert. The processes, too, of preventing decay by the total expulsion of the sap, and by the neutralisation of its properties, have had many exponents. Amongst others, I may especially refer to Mr. Kyan, who may be regarded as the pioneer of the theory of injection, and whose method of injecting chloride of mercury is distinguished by his name. Burnett's system of injecting chloride of zinc, Lege and Pironnette's system of injecting sulphate of copper, Mr. Payne's preparation by injecting sulphate of iron and muriate of lime, and Mr. Bethell's process of creosoting, are all methods of similar character, though employing different agents, the inventors of which follow the same principle as that adopted by Mr. Kyan. Mr. Clift, in describing Bethell's creosoting process, uses these words, which clearly repre-

sent the effect intended and produced. He says: "when injected into a piece of wood the creosote coagulates the albumen, and thus prevents putrefactive decomposition, and the bituminous oils entering the whole of the capillary tubes encase the woody fibre as with a shield, and close up the whole of the pores so as to entirely exclude both water and air. These bituminous oils being insoluble in water, and unaffected by air, render the process universally applicable." I quote these words because they fitly describe the effect aimed at by the process of *injection*, viz., the preservation of wood when exposed to the influence of the weather.

The immersion of wood in a solution of lime renders it, by the cheap and simple process of *absorption*, equally durable when used above ground and under shelter, and will be found worth equal attention. That timber, when immersed for a short time in a solution of lime, undergoes much the same chemical changes as when subjected to the action of metallic agents, or to the process of creosoting, will be apparent from the following statement of Dr. Voelcker, who, at the request of Mr. Bigge, has analysed three specimens of the timber used. They were,—

"1. Piece of native Scotch fir grown in a peaty soil at Chetwynd Park, cut down in 1840, and used in a cart-shed after having been soaked three weeks in lime-water. Age about sixty years growth."

"2. Piece of Scotch fir from the same wood as No. 1, but not soaked in lime-water."

"3. Piece of Scotch fir soaked in lime-water, about three weeks since (December, 1867).

Upon these specimens the Doctor makes the following remarks in a letter to me:—

"I have found that the timber submitted to the lime process contains considerably more lime than portions of the same wood not soaked in lime-water, for timber thus soaked absorbs and retains appreciable quantities of lime.

"Timber treated in this way, I am assured, stands the weather remarkably well, and is not subject to the decay to which unprepared timber is so liable. A ready explanation of the cause of the benefit resulting from soaking wood in lime-water suggests itself in the well-known property of lime to combine with albumen, and similar nitrogenous compounds present in all wood, to form with them insoluble and stable compounds.

"Soluble albuminous matters, I need hardly say, exist in larger proportions in green sap-wood than in hard old wood, and this is one of the chief reasons why young or green wood decays so readily, for the soluble albuminous compounds in the sap of the wood are prone to suffer decomposition in the presence of damp air, and their decomposition affects the woody structure and causes its gradual decay.

"They, therefore, are justly regarded as the primary cause of the decay in timber. Soaking in water, especially in running water, to some extent removes from wood soluble albuminous matters, and in some measure improves the condition of timber by rendering it more capable to resist decay than otherwise. In practice, however, it has been found that immersion in common water does not satisfactorily remove the injurious albuminous compounds, which by their subsequent decomposition on exposure to air cause the gradual decay of timber.

"Lime, like corrosive sublimate, precipitates albuminous matters, and renders them inactive. Hence it is largely employed by sugar-boilers, for the purpose of removing such matters from the juice of sugar cane. For the same reason it appears to me well adapted to neutralise and render inactive the soluble albuminous matters in timber, and thereby to protect it against decay. I may mention further that wood immersed for some days in lime-water takes up lime, in the shape of a perfect solution, as caustic lime. On subsequent exposure of the wood to the air, the excess of lime which remains in the wood after the precipitation of the albuminous compounds gradually absorbs carbonic acid, and the woody fibre throughout the whole mass of the wood becomes coated with insoluble carbonate of lime. To some extent the interstices of the timber become filled with carbonate of lime, and the wood to some extent is mineralised, which strikes me is an additional recommendation of the lime process of protecting timber against decay."

Such is the chemical view of the question.

I will now give you the result of mechanical test, with a view to show how far the impregnation of the wood with carbonate of lime hardens and strengthens it, or the reverse. Upon this point I have consulted Mr. David Kirkaldy, the value of whose experiments upon the strength of materials is well known. The following figures represent the result of the experiments he has recently made to ascertain the resistance to a pulling strain and a thrusting stress of four pieces of wood marked A, and four marked B.

Pulling Stress.

A. No.	A. Stress in lbs. per Square Inch.	B. No.	B. Stress in lbs. per Square Inch.
	lbs.		lbs.
1	6381	1	8961
2	5896	2	7782
3	5788	3	7302
4	4437	4	6441
Mean ..	5626	Mean ..	7622

P 2

Thrusting Stress.

A. No.	A. Stress in lbs. per Square Inch.	B. No.	B. Stress in lbs. per Square Inch.
	lbs.		lbs.
1	3325	1	3305
2	2790	2	2832
3	2638	3	2722
4	2448	4	2288
Mean ..	2800	Mean ..	2787

The four pieces of wood marked A were from a tree cut down last year and sawn up this winter. They were not steeped in lime solution.

The wood marked B was from the same tree, and was sawn out at the same time. It was steeped in lime solution for about three weeks.

Any comment upon these figures is superfluous, but the result arrived at is I think very satisfactory, for, while under the thrusting stress there appears to be little or no difference between the two conditions of wood, in the case of the pulling test the difference is greatly in favour of the prepared wood.

Having given these short explanations of chemical and mechanical advantages, I have only to add a statement of the means by which the steeping is effected.

Pits or ponds may be constructed, varying in size and position with the locality in which they are made, and the quantity of timber to be soaked. The simpler their character the more profitable their use. A common pond, from which cattle can be excluded, is perhaps the best soaking tank that can be adopted. All that is essential is to have depth and size sufficient to steep and hold timber of all characters and dimensions that may be required upon the estate, and it is unnecessary to say that a little outlay in the first instance to make the tank sufficiently commodious may be a means of saving in the end. Having secured a good supply of water in the tank, the next point is to immerse in it a sufficient quantity of lime to satisfy the water, that is, to feed it with all it is capable of absorbing and retaining—thus in fact, impregnating the water completely with lime. To render this intelligible, we will assume that it is intended to make it a steeping tank or pond 50 feet long and 20 feet wide; this if filled with water 6 feet deep, will contain 37,500 gallons. As it requires only 88 grains of chalk or stone lime to impregnate one gallon of water, 46 lbs. of lime will satisfy this quantity of water if equally distributed through its bulk; but as it is better to make sure of uniform effect, such a

quantity should be used as will cover the bottom of the pond. It will not require many bushels to do this, and the mixture should be renewed at discretion as the pond receives fresh water. In the solution thus made, the timber cut to the required scantlings and sawn on all sides is placed, the larger pieces intended for beams, &c., at the bottom of the bath, and the smaller timbers intended for rafters, boards, skirtings, &c., at the top. In this condition they remain for periods varying according to the size of the timbers from three to nine weeks. They are then taken out, and after being exposed for a few days to the sun and wind are dry enough and ready for use.

The woods most suitable for the process and most benefited by its application, are those of the order Coniferæ, though it may be found when more generally tried that many other woods are benefited by it. At present poplar resists the application.

It is needless to observe that it is not advisable to use young trees, even though they may have grown rapidly, and attained a size beyond their age. Forty years would probably be found to be the earliest period of growth at which fir timber would be serviceable for use. Mr. Selby in his book of 'British Forest Trees,' p. 408, thus speaks of wood of the Coniferæ tribe. "It has also been used for roofing and other building purposes with success, and found durable after having undergone the process of steeping in lime-water; this mode of protecting the fibre of Scotch fir sap-wood was first practised by Sir J. Menteath, Bart., of Closeburn, Dumfrieshire, some fifty years ago, and he finds that sap-wood which unprotected would not have lasted thirty years, after having been subjected to this treatment, shows not the slightest symptoms of decay after having been put up more than forty years. The solution is made by dissolving a small quantity of quick lime in the water in which the wood is steeped, and in which it ought to remain for ten days or a fortnight. Kyanising, or the solution of corrosive sublimate, would doubtless be equally, if not more, effective than the lime, but more costly in its application."

I am afraid I have extended my remarks somewhat beyond the limits of a letter, but as the writer of the Prize Essay on Roofs for Farm Building, I have felt considerable interest in the matter, and have been impelled to make the communication with the hope that Mr. Burton Borough's proceedings may become a profitable example to the country.

I am, dear sir, yours truly,

ARTHUR BAILEY DENTON.

22, *Whitehall Place*, 6*th March*, 1868.

XV.—*The Agricultural Returns of* 1866 *and* 1867.
By James Lewis.

After many years of expectation and disappointment, agriculturists have at length been furnished with returns sufficiently reliable for many practical purposes, showing the distribution of the land under different kinds of cultivation, and of the cattle, sheep, and pigs in each county of Great Britain, during the two years 1866 and 1867.

So important an instalment of a complete system of agricultural statistics has a strong claim to notice in these pages, and although the appearance of the Returns within so short an interval before the time for publication of the present number of the Journal renders it impossible, both from considerations of time and space, to analyse them as thoroughly as might be wished, it seems desirable that, at any rate, their leading characteristics should be indicated in conjunction with such a condensed view of the statistics themselves as may serve for future reference and comparison.

The first cattle census was taken on 5th March, 1866, and its results were discussed in this Journal (Part II., Vol. II., s.s. 1866); at the same time it was announced that other statistics were in process of preparation, and in December, 1866, Returns were issued by the Board of Trade, giving the acreage of land under crops, bare fallow, and grass, as ascertained in the preceding June by the officers of Inland Revenue from occupiers of *five acres* and upwards, in every county of Great Britain. The stock and acreage Returns of 1866, form the first chapter of, or (more correctly) the introduction to, what agriculturists, economists, and statists are alike interested in hoping will become an annual series of statistics of agriculture, to be enlarged, revised, and perfected, as experience may suggest.

But whether the Returns are to appear annually or not—and an expression in the official preliminary observations upon those recently published seems to indicate that an annual series is contemplated—it was wisely determined to obtain them in a more complete form both for cattle and acreage in 1867; forms were therefore sent by post to *all* occupiers of land and owners of stock in Great Britain, with a request that they would fill in their acreage under different kinds of cultivation and the number of their live stock on the 25th of June, 1867, according to printed instructions, and promptly return the schedules to the collecting officers. The great number of occupiers and owners rendered a large staff of persons necessary throughout the country to collect

the Returns, and the officers of Inland Revenue (Surveyors of Excise) were "selected by the Government as a convenient and efficient local agency to obtain the information with as little trouble as possible to the occupiers of land."

It was explained by a circular letter that, in collecting agricultural Returns, the only object was to obtain for the information of the public reliable facts as to the home supply of corn and cattle; and for the purpose of showing that nothing which could in any way injure the interests of individual occupiers was intended to be published, the Returns for the previous year were largely circulated in the agricultural districts.

Farmers will soon begin to discover that any fears they may have entertained of the application of the statistics to their own detriment are chimerical; but it is to be hoped that the plan of widely distributing the Returns will not be discontinued when the need which is at present recognised of removing distrust is no longer felt. Those most intimately concerned in the supply of agricultural produce are clearly entitled to early and ample participation in whatever benefits are derivable from such information as the Government and the public obtain through their instrumentality.

During the months of June, July, and August of last year, the collecting officers were employed in getting in the Returns, which were afterwards carefully examined in London with the view of affording correct data of comparison with subsequent years; this examination, entailing frequent references to the collecting officers in different parts of the country, delayed the publication of the Returns—a delay for which increased exactitude sufficiently makes amends. It is believed that in future an endeavour will be made to get the statistics tabulated and printed at an earlier date, although much must depend in that respect upon the correctness of the local returns; their value would be immensely enhanced if they were available for use by the end of August or early in September.

The Returns for 1866 are republished with those for 1867; but for several reasons—notably the difference in the date of the stock returns in the two years, and the extension of the acreage returns in 1867 to all occupiers in lieu of the previous limitation to occupiers of five acres and upwards—the difference between the results for the two years cannot always be taken as the actual variation in the acreage under cultivation, or in the number of live stock.

The total number of occupiers of land and owners of stock from whom Returns were obtained in 1867 is thus given:—

	Occupiers of Land owning Stock, and Occupiers of Land only.	Owners of Stock only.*	Total Occupiers of Land and Owners of Stock.
England and Wales ..	390,660	8,029	398,689
Scotland	78,792	4,629	83,421
Great Britain	469,452	12,658	482,110

For Ireland Mr. Donnelly does not give the number of distinct occupiers, but of *holdings*, which amounted in 1867 to about 600,000; Lord Dufferin in his recent work on 'Irish Emigration and Land Tenure' (pp. 201-2) states that the 600,000 *holdings* in Ireland have 441,000 distinct and separate occupiers. And although the fact is nowhere stated, there are strong reasons for assuming that the 469,452 "occupiers" of Great Brtiain, as given in the Returns, represent in reality the number of *holdings*, two or more of which may be in the occupation of one person. The Commissioners for taking the census of Great Britain in 1851 obtained Returns of the number of farms and farmers, the size of their farms, and the number of labourers employed thereon, and in their Report† it is stated that in England and Wales, in 1851, there were 225,318 farms of all sizes (including about 8000 of a less area than five acres), in Scotland 56,650; in Great Britain, therefore, an aggregate of 281,968 farms. It may be convenient to put the facts for 1851 and those for 1867 in juxtaposition:—

	Number of *Farmers* in 1851.	Number of *Occupiers* in 1867.	Acreage under Cultivation.	
			1851.	1867.
England and Wales ..	225,318	390,660	24,905,758	25,451,526
Scotland	56,650	78,792	4,188,578	4,379,552
Great Britain ..	281,968	469,452	29,094,336	29,831,078

According to this statement, which correctly represents the facts as officially published, the number of farmers in Great Britain has increased 66 per cent., while the acreage under cultivation has remained virtually stationary; in both periods the returned area actually farmed is deficient by a probably equal (or inconsiderably differing) amount of hill or mountain pasture.

* Cows kept in towns for dairy purposes are included in the returns both for 1866 and 1867.

† Report of Census Commissioners for Great Britain, 1851; (Part ii., pp. lxxviii.—lxxxi.)

At the census of 1861 the Commissioners, reckoning upon the anticipated adoption of a system of agricultural statistics, did not think it necessary to make full use of the information supplied to them by the farmers; but they selected a county from each of the divisional groups into which England and Wales is classified for registration purposes, and gave the number of *farmers* therein, which is subjoined for comparison with the number of *occupiers* making Returns in 1867:—

	Number of "Farmers" in 1861.		Number of "Occupiers" in 1867.
Sussex	3,797	....	7,903
Bucks	1,866	....	3,831
Cambridge	3,500	....	4,770
Norfolk	6,373	....	10,839
Wilts	2,974	....	5,732
Salop	5,424	....	10,102
Lincoln	9,971	....	20,201
Cheshire	6,834	....	11,493
North Riding	7,099	....	12,631
Cumberland	4,953	....	6,539
	52,791	....	94,041

The number of farmers in these ten counties varied little between 1851 and 1861; but if the Returns just published under the authority of the Board of Trade be (as in the absence of any warning to the contrary it must be assumed they are) intended for literal acceptance, then in the six years since 1861 the farmers in those counties have nearly doubled in number. It is, however, generally believed that the tendency of late years has been to amalgamate farms, consequently to diminish the number of separate occupiers; and it is very desirable that the extent to which that amalgamation is going on should be determined with something like an approach to accuracy. If the Board of Trade will accept a suggestion which has for its object the increased value of the Returns, not only the number of distinct and separate occupiers, but the number and sizes of their holdings will be introduced into the series for 1868. In 1851 the Census Commissioners ascertained that to every 1000 farmers in Great Britain the acreage of their farms was distributed according to the following proportions:—

	England and Wales.		Scotland.
Under 100 acres	638	....	792
" 200 acres	205	....	125
" 300 acres	82	....	39
" 400 acres	36	....	17
" 500 acres	16	....	8
" 600 acres	9	....	5
" 1000 acres	11	....	8
1000 acres and upwards	3	....	6
	1000		1000

It further appeared that there were nearly as many acres (2,152,050) in the hands of 2038 English farmers having farms of 700 acres and upwards, as there were acres (2,141,990) in the occupation of 97,800 small farmers; and the Census Commissioners remark upon this "that when agricultural statistics are obtained, the comparative results of farming in the large and small way will be evident." At present our Returns are deficient in this particular, but as the object of the Board of Trade should be to get the statistics of agriculture for Great Britain into a form which shall admit of full and exact comparison with the admirably complete system that Mr. Donnelly has long since perfected in Ireland, it may reasonably be asked that information as to the number and size of holdings shall be included in subsequent Returns. Meanwhile the statement, official though it be, that the present occupiers of land in Great Britain amount to 469,452; and that the average size of their farms is about 63 acres (exclusive of woods, plantations, or mountain pasturage), must be accepted with reserve until an explanation, which will remove the difficulties above referred to, is forthcoming.

The Commissioners of Inland Revenue in their Report for the year 1866-7 (p. 15) state that "The owners and occupiers of land in England have in many instances again shown reluctance to afford the information required, and have occasioned the officers much additional trouble. In Scotland they have, as before, manifested the greatest readiness to make the returns, and in that part of the kingdom there are very few cases in which it has been necessary to resort to estimates."

To what extent the Returns for 1867 are the result of *estimate* is not stated, but I am informed that the proportion is lower than in the previous year; the omission of this information from the Cattle Census of 1866, which was remarked upon in a former article in this Journal, was in some degree supplied in a subsequent Parliamentary Return (No. 528, Session of 1866), whence it appears that of the 29,311,736 head of stock accounted for in 1866 as existing in Great Britain, 677,577, or a little over 2 per cent., were *estimated* by the collecting officers in default of returns by owners. The ratio of defection varied greatly in different localities: in England 1·69 per cent. of cattle, 3·15 per cent. of sheep, and 2·18 per cent. of pigs were arrived at by estimate; in Wales the corresponding ratios were 1·64, 1·78, and 1·95 per cent.; while in Scotland they were ·75, ·96, and ·38 per cent. Of the 34 Scotch counties the Returns were complete in 7 for all kinds of stock, in 8 for cattle alone, in 14 for sheep, and in 11 for pigs; in England and Wales the county of Rutland supplies the solitary instance of no defaulters under either head. The English Returns were most defective in the following counties:—

CATTLE.	Percentage estimated.	SHEEP.	Percentage estimated.	PIGS.	Percentage estimated.
Herts	6·0	Wilts	12·2	Carmarthen	9·4
Devon	5·4	Herts	8·6	Middlesex	6·7
Wilts	5·3	Sussex	7·9	Wilts	5·7
Cardigan	4·0	Devon	7·1	West Riding ..	5·6
Hunts	3·9	Dorset	6·7	Herts	5·4
Dorset	3·8	Hunts	6·3	Dorset	4·3

Into the causes of the pre-eminence of these counties in the matter of defective Returns it is not necessary now to enter; but it may possibly serve a useful purpose thus to have recorded some of the most flagrant instances of omission, let us hope only to indicate the measure of future improvement. The requsition for particulars of their stock and acreage is a novelty to English farmers, and the object and meaning of such a requisition are probably as yet hardly understood; in Scotland, on the other hand, the farmers having long since been familiarised with these statistics through the labours of the Highland Society, know their value and give their hearty co-operation, and it may safely be predicted that a similar acquiescence will gradually be yielded south of the Tweed.

The subjoined statement gives in broad outline the results of the Acreage Returns in 1866 and 1867:—

	TOTAL AREA in Statute Acres.	TOTAL ACREAGE returned under all kinds of Cultivation.		Arable.		Pasture.	
		1866.	1867.	1866.	1867.	1866.	1867.
England and Wales . .	37,324,883	24,521,411	25,451,526	14,265,663	14,433,492	10,255,748	11,018,034
Scotland . . .	19,639,377	4,158,360	4,379,552	3,265,294	3,326,267	893,066	1,053,285
Great Britain .	56,964,260	28,679,771	29,831,078	17,530,957	17,759,759	11,148,814	12,071,319
Ireland . . .	20,815,460	15,550,231	15,542,208	5,545,987	5,485,136	10,004,244	10,057,072
Islands in British Seas .	226,684	115,258	117,811	93,529	89,661	21,729	28,150
United Kingdom	78,006,404	44,345,260	45,491,097	23,170,473	23,334,556	21,174,787	22,156,541

Under the head of "arable" land in this table is included the acreage under all corn and green crops, bare fallow, clover and other grasses under rotation, and hops or flax; the pasturage is exclusive of heath or mountain-land in Great Britain, but inclusive thereof in Ireland — a discrepancy which greatly impairs the value of the Returns for comparative statistical purposes.

The areas of the several divisions of the kingdom are taken from the respective Census Reports of 1861, presumably the most accurate sources of information in that respect; they are inclusive of a certain amount of *water area*, which as nearly as

can be ascertained is about 952,000 acres in England and Wales, 155,000 acres in Scotland, and 500,000 acres in Ireland, making altogether for the United Kingdom about 1,607,000 acres. To ascertain the proportion of cultivated acreage (as returned) to total area, deduction is first made for this water area, and then it appears that 60 per cent. of the total *land area* of the United Kingdom was returned in 1867 as under some sort of cultivation, 31 per cent. of that cultivated proportion being arable, and 29 per cent. pasture ; the proportions for the several divisions were as follows :—

	Proportion per cent. Cultivated.		
	Total.	Arable.	Pasture.
Ireland	77	27	50
England and Wales	70	40	30
Islands in British Seas	52	40	12
Scotland	22	17	5

The discrepancies which these ratios bring to light arise from the omission in the Scotch and English Returns of heath and mountain pastures, which are included in the Irish Returns: that this is so will be more clearly manifest on comparing the number of live stock sustained in the three kingdoms with their respective areas.

	Estimated Population on 1st Jan., 1867.*	Estimated Total *Land* Area in Statute Acres.	Total Live Stock returned in 1866.	Total Live Stock returned in 1867.
England and Wales ..	21,463,597	36,372,883	22,899,542	28,811,718
Scotland	3,162,091	19,484,377	6,412,194	8,061,380
Great Britain	24,625,688	55,857,260	29,311,736	36,873,098
Ireland	5,569,910	20,315,460	9,517,713	9,762,286
Islands in British Seas	143,447	226,684	118,272	129,124
United Kingdom ..	30,339,045	76,399,404	38,947,721	46,764,508

The anomaly which is most apparent in the Returns is the disproportion of stock to the total area returned as under cultivation ; Scotland, for example, appears to have nearly *twice* as many live stock in proportion to her cultivated area as England, but on the other hand, according to the Returns, Scotland has only *half* as much pasture in proportion to her cultivated area as England. In fact if the Returns of stock and acreage are compared the results in the following table are arrived at, and they sufficiently attest the necessity for bringing into any future Returns the tracts of mountain or other pasture.

* The population used throughout this paper for each division of the United Kingdom has been estimated to a uniform date—1st January, 1867—and will therefore not agree with the figures given in the Returns.

	Acres of *Land* Area to every 100 of Population.	Proportionate Number of Live Stock in 1867.			
		To every 100 of Population.	To every 100 Acres of		
			Total *Land* Area.	Total Cultivated Area.	Pasture.
England and Wales ..	169	134	79	118	262
Scotland	616	255	41	184	765
Ireland	365	175	48	63	97
Islands in British Seas ..	158	90	57	110	459

The cattle are returned for Scotland, but the pasturage on which they feed is evidently to a great extent omitted.

It is much to be regretted that no means exist of anything like a trustworthy nature for determining even approximately the acreage in England and Scotland, which, although under no cultivation, is available for pasture of cattle and sheep; there are *estimates* of the amount of land so available, but in the absence of any reliable authority on the matter it seems of little use to make such estimates the basis of deduction or inference at the present time. No doubt, to get an accurate return of the heath and mountain land fed over by sheep or cattle would be difficult for such parts of the kingdom as are not yet included in the Ordnance Survey, but something like an approximation might probably be arrived at. Each occupier should be asked to return separately (*a*) the acreage of *enclosed meadow land;* (*b*) the actual or estimated acreage of *hill-pasture, heath, or mountain used for feed of stock.*

As has been before remarked no actual comparison can fairly be instituted between the Returns for 1866 and 1867 because of the difference in the periods of enumeration of the live stock and the alteration of the limits of holding; and as regards the acreage a modification of the Schedule in 1867 has further to be taken into account. Under the heading of "Permanent Pasture" the Returns of 1866 comprised all "Meadow or Grass not broken up in rotation (*exclusive of Hill Pastures*);" this exception was only intended to apply to large tracts of mountain land with heathy and scanty pasture, but as there were reasons for believing that a large acreage of "down" and other hilly grass land was not returned in 1866 in consequence of too literal an interpretation of the words of exception, the Schedule for 1867 was altered so as to include "down" land, and the heading became "Permanent Pasture, Meadow, or Grass, not broken up in rotation (*exclusive of Heath or Mountain land*)" in substitution for "exclusive of Hill Pastures." This amendment, in conjunc-

tion with the collection of Returns from all occupiers, instead of those only who held five acres and upwards, has led to an increase in the permanent pasture of 1867. That increase amounts to 762,286 acres in England and Wales—towards which Wales contributes 214,406 acres, the South-Western Counties of England 180,496 acres, the South-Eastern Counties 74,337 acres, the West Midland Counties 64,273 acres, Yorkshire 61,452 acres, the North Midland Counties 51,632 acres, the South Midland Counties 44,997 acres, the North-Western Counties 35,855 acres, and the Northern Counties 32,728 acres; in Scotland the increase of pasturage was 160,219 acres—chiefly contributed by the Southern, Western, and Midland Counties; in Ireland where no alterations invalidate the comparison of one year with another there was an increase of 52,828 acres of pasturage, with a corresponding decrease of 60,851 acres of arable land. The pasturage Returns of 1867 show an increase on those of 1866 of 7 per cent. in England and Wales, and 18 per cent. in Scotland, which must be ascribed to the alterations just referred to; the live stock increased 26 per cent. in England and Wales, and 26 per cent. in Scotland, partly in consequence of the extension of the Returns to all holdings, but partly also to the collection of the Returns at two different periods of the year, as well as to other circumstances to which reference will be subsequently made.

The variations in the two years' Returns of arable land are inconsiderable, and under this head therefore it may be assumed that 17,759,759 acres represent with sufficient exactness the extent of land under tillage in Great Britain in 1867.

A Table appended to this paper (Table I.) shows the distribution of the arable and pasture land as returned in 1866 and 1867 for each county of England and Wales, and of Scotland. At the present time it does not seem advisable to attempt any minute analysis of those detailed facts; they are recorded for reference, and will be valuable for use when the statistics of agriculture have resolved themselves into a shape to admit of full investigation.

And this seems the proper place to give expression to a regret that the Agricultural Returns of 1867, like those of 1866, are tabulated for counties according to an alphabetical arrangement, which, for reasons previously stated in this Journal, is open to great objection, and for which there appears no sufficient reason. The Board of Trade cannot possibly have any interest in continuing thus to impair the great usefulness of these Returns by adhering to the alphabetical arrangement in preference to one based on a topographical system which has the sanction of the best statistical authorities. It may be hoped that this criticism will be accepted in the same spirit in which it is

offered, and that the Returns of 1868 will be free from what cannot but be regarded as a defect. The facts given in the annexed Table V. have been remodelled from the Official Returns in accordance with this view of the matter, but the labour thus necessitated should hardly have to be incurred by the student of future Returns.

Subjoined is the distribution of the arable land under the various kinds of cultivation (see page 224).

According to this statement 55 per cent. of the arable land of England and Wales was under corn crops in 1867, the corresponding proportion for Scotland being 41 per cent., for Ireland 38½ per cent., and for the adjacent islands 36 per cent. Under all kinds of green crops (including clover and artificial grasses under rotation) the ratio of acreage to the entire arable area was 39 per cent. in England and Wales, 56 per cent. in Scotland, 56 per cent. in Ireland, and 58 per cent. in the Islands. The proportion of bare fallow or uncropped arable land was ·5 per cent. in Ireland, 6 per cent. in England and the Islands, and 3 per cent. in Scotland. Flax culture employed 5 per cent. of the arable land of Ireland, and hops in England occupied ·4 per cent. of the arable acreage.

The variations in the acreage under "bare fallow," as returned for the two years, are partly owing to mistakes or misconceptions in some districts as to the land that should have been returned under that head.

Of the 64,280 acres bearing hops in England in 1867 nearly two-thirds (40,762) were in Kent, 9989 acres in Sussex, 5335 in Hereford, 2992 in Hants, 2421 in Worcester, and 2193 in Surrey: the increase of nearly 8000 acres of hops in 1867 over 1866 is not accounted for in the Returns.

In so far as the Returns for the two years are comparable, the following Table shows the fluctuations of the acreage under cultivation for the several crops. Thus, in England and Wales, 16,465 acres more of wheat were sown in 1867 than in the previous year; 16,968 more of barley; 12,854 more of beans; 226,064 more of clover and other grasses in rotation; and 15,998 more of turnips and swedes. On the other hand, there was a diminution of 20,729 acres of potatoes; 2516 acres of oats; 8567 acres of rye; 2041 acres of peas; 31,326 acres of cabbage, kohl-rabi, and rape; 32,999 acres of other green crops; and 31,390 acres of bare fallow. In Scotland there was an increase in the acreage under wheat, barley, potatoes, turnips and swedes, and clover; a decrease in the oat, bean, pea, and all green crops except turnips and potatoes, as well as of acreage under bare fallow. In Ireland, the extent of wheat and oat crop was diminished, while the barley acreage increased; potatoes were reduced

DISTRIBUTION OF ARABLE LAND UNDER CULTIVATION IN 1866 AND 1867.

	Years.	ACREAGE RETURNED UNDER							
		Wheat.	Barley or Bere.	Other Corn Crops.	Potatoes.	Clover and other Artificial Grasses under Rotation.	Other Green Crops.	Bare Fallow, or Uncropped Arable Land.	Hops and Flax.
England and Wales ..	1866	3,240,293	2,023,710	2,622,241	355,417	2,552,809	2,543,760	870,857	56,576 (*hops*)
	1867	3,256,758	2,040,678	2,623,315	334,688	2,778,873	2,495,433	839,467	64,280 (*hops*)
Scotland	1866	110,101	213,619	1,042,820	143,426	1,141,415	519,831	94,080	2 (*hops*)
	1867	111,118	218,486	1,034,425	157,529	1,211,101	510,513	83,091	4 (*hops*)
Great Britain	1866	3,350,394	2,237,329	3,665,061	498,843	3,694,224	3,063,591	964,937	56,578 (*hops*)
	1867	3,367,876	2,259,164	3,657,740	492,217	3,989,974	3,005,946	922,558	64,284 (*hops*)
Ireland	1866	299,190	152,520	1,722,323	1,050,353	1,601,423	431,252	25,419	263,507 (*flax*)
	1867	261,908	172,637	1,680,592	1,001,545	1,658,451	430,707	26,191	253,105 (*flax*)
Islands in British Seas	1866	11,767	8,379	12,303	6,347	29,400	14,052	11,281	..
	1876	11,141	8,146	12,736	6,862	31,008	14,519	5,249	..
United Kingdom ..	1866	3,661,351	2,398,228	5,399,687	1,555,543	5,325,047	3,508,895	1,001,637	320,085
	1867	3,640,925	2,439,947	5,351,068	1,500,624	5,679,433	3,451,172	953,998	317,389

by 48,808 acres; clover and other grasses being increased 57,028 acres.

Deferring for the present any analysis of the facts relating to the distribution of the acreage under different crops in each county, it may be remarked that in twenty-one English counties the wheat area was larger in 1867 than in 1866, the increase being very marked in Devon, the East Riding, and Sussex; in the remaining counties the wheat acreage had decreased in 1867, the largest reduction occurring in Essex, Durham, and Northumberland.

To what extent the variations in different counties, some of which are very striking, in the acreage returned for the two periods under the several crops are due to an improvement in the Returns, to the alteration of the limit of holding, or to an actual change of cultivation, time will not now admit of discussion.

Passing now to comment briefly on the distribution of the Live Stock of the United Kingdom, the first noticeable point is that no account is given in the Returns of the number of horses in Great Britain. The cause of this omission although not explained may be surmised; but it may be hoped that an endeavour will be made, as objections diminish, to repair the defect. In Ireland Mr. Donnelly enumerates the number of horses, and classifies them according to age, distinguishing those employed (1) for agricultural purposes, (2) for traffic and manufactures, and (3) for amusement or recreation. The horses in Ireland so returned in 1867 numbered 522,348, including 34,189 under one year of age, 34,797 one and under two years of age, 453,362 two years old and upwards; and of these latter 396,816 were employed in agriculture, 26,966 in traffic and manufactures, and 29,580 for amusement or recreation.

It should be remembered that in the propositions submitted by Mr. Caird to, and which were adopted by, the Statistical Congress of London in 1860, horses were specially included as a necessary item in the returns of live stock.

According to the Returns the stock of cattle, sheep, and pigs, in the United Kingdom, were distributed in 1866 and 1867 as exhibited in the Table on p. 226.

In Great Britain there was an increase of 207,198 cattle, 6,870,820 sheep, and 483,344 pigs in 1867 as compared with 1866; and this is explained partly by the difference in the period at which the Returns of the two years were collected, and partly, as regards pigs and sheep, by their exceptionally high prices in 1866, which had the effect of increasing their number in 1867. The heading of the column for "cows" in the Schedules of 1867 was altered to "cows and heifers in milk or

Distribution of Live Stock in 1866 and 1867.

	Years.	Live Stock Returned.				
		Cows.	Other Cattle.	Total Cattle.	Sheep.	Pigs.
England and Wales	1866	1,513,075	2,335,360	3,848,435	16,793,204	2,257,903
	1867	1,655,958	2,357,606	4,013,564	22,025,498	2,772,653
Scotland	1866	370,447	566,954	937,401	5,255,077	219,716
	1867	382,134	597,336	979,470	6,893,603	188,307
Great Britain	1866	1,883,522	2,902,314	4,785,836	22,048,281	2,477,619
	1867	2,038,092	2,954,942	4,993,034	28,919,101	2,960,963
Ireland..	1866	1,482,616	2,263,541	3,746,157	4,274,282	1,497,274
	1867	1,519,720	2,182,658	3,702,378	4,826,015	1,233,893
Islands in British Seas	1866	16,600	21,100	37,700	57,685	22,887
	1867	15,182	20,879	36,061	72,835	20,228
United Kingdom	1866	3,382,738	5,186,955	8,569,693	26,380,248	3,997,780
	1867	3,572,994	5,158,479	8,731,473	33,817,951	4,215,084

in calf," and this alteration partly accounts for the apparently greater increase of cows than of other cattle.

The increase of cattle in England and Wales and in Scotland was at the rate of 4 per cent., while in Ireland the numbers decreased; the return of sheep increased 31 per cent. in England and Wales and Scotland, and 13 per cent. in Ireland; pigs were more numerously returned in England and Wales by 23 per cent. in 1867 than in the previous year, but in Scotland and Ireland the numbers decreased.

Returns of acreage under crops and of the number of Live Stock in various foreign countries have been furnished by their respective Statistical Departments to the Board of Trade, and the principal facts will be found at the end of this paper (Table II.) for convenience of comparison with those of the United Kingdom. The estimates of foreign agricultural produce (Tables III. and IV.) should remind the Board of Trade that a very important item of information—supplied, by the way, in the Irish Agricultural Statistics, and quoted in the Appendix hereto (Table V.)—is yet wanting in the Agricultural Returns of Great Britain.

In concluding this very hasty and imperfect sketch of the Agricultural Returns, I cannot refrain from once more urging that in future some better arrangement of the tabular matter for each county should be adopted than the alphabetical one which appears to satisfy the Board of Trade. The Registration, Poor Law, and Educational Statistics of Great Britain are published according to a topographical arrangement, which brings together in groups counties lying proximate one to another; and the advantage of this plan is that it admits of a broad view being taken of the facts observed—an essential element in statistical analysis always, but particularly so when time and space are both limited. In the present case it has been found impracticable to make use of the County Tables to anything like the extent desired, for the want of time to throw the facts into a properly comparable form; hence little has been attempted beyond a mere statement of some few of the features of the Returns which most readily attracted attention.

Exception must also be taken to the basis upon which the percentages are calculated in the Returns. The calculations given by the Board of Trade relating to the stock and acreage of the United Kingdom are—

1. Percentage of acreage under		corn crops	to total acreage returned as under cultivation.
"	"	green crops	
"	"	bare fallow	
"	"	clover, &c.	
"	"	permanent pasture	

2. Proportionate number of cattle, sheep, pigs } to every 100 acres returned as under cultivation.

3. Percentage of acreage under the several kinds of corn crops to total acreage under corn crops.

4. Percentage of acreage under the several kinds of green crops to total acreage under green crops.

For each county percentages are given :—

1. Of acreage under corn crops to total acreage returned as under cultivation.

2. Of cattle, sheep, pigs } to total acreage returned as under cultivation.

Now, in view of the fact that the acreage returned as under cultivation falls considerably short of the acreage available and absolutely used for the sustenance of stock, and that this deficiency is strongly marked in some counties, while in others it is of small account, it seems clear that a basis less open to objection than that of the area returned as under culture should be adopted for calculation. In comparative statistics the first consideration ought to be to fix upon a *unit of value* that is applicable to all the elements of comparison, and that is as nearly as possible invariable in itself. To get the just measure of variation in returns of acreage under different kinds of cultivation in different localties, and at different periods, the following method of arranging the facts and calculating the ratios is suggested. Take the County of Bedford as an example :—

	Acres.
Total area	295,582
Returned as under cultivation in 1867	249,615
Unaccounted for	45,967
Pasture	73,250
Arable	176,365
Under corn crops	114,724
Under green crops (including clover, &c., and hops)	49,880
Bare fallow	11,761

From these facts the following ratios are derived :—

	Per Cent.
1. Proportion of total area returned as under *cultivation*	84
2. ,, ,, left unaccounted for	16

		Per Cent.
3. Proportion to *cultivated area:* of pasture	.. ..	29
4. " " of arable	.. ..	71
5. Proportion to *arable land:* of corn crops	.. ..	65
6. " " of green crops	.. ..	28
7. " " of bare fallow	.. ..	7

If necessary the corn and green crops might be subdivided on the same plan.

In this way the whole acreage of the county is accounted for, and the yearly fluctuations in the mode of culture would be indicated in the clearest possible way.

On the plan adopted by the Board of Trade it is made to appear that the percentage of corn crops of Bedfordshire in 1867 had decreased to 46·0 from 46·7 in 1866—the fact being that there was an increase of 1600 acres under corn in 1867; the inclusion of 5376 acres more pasturage in 1867 than in 1866 had the effect of increasing the area under cultivation—the unit of value—and thus the accuracy of the comparison is destroyed.

In regard to the percentages of live stock the basis adopted is the cultivated acreage (as returned), and is therefore open to similar objection: until the acreage available and used for the sustenance of cattle is accurately determined the better plan would be to estimate the percentages of stock to the total area of each county, and, as a supplementary measure, to the population.

Under the circumstances thus affecting the principle upon which the calculations in the Returns have been made it has not been thought advisable to make any use of them whatever on the present occasion. The difficulties involved in systematising the Returns of Agriculture, and getting them into a proper working order are fully appreciated, and it is only as a contribution towards their perfection that the criticism thus offered has found a place in the pages of this Journal. At any rate it is offered in the utmost freedom from any desire to disparage the labours of the Board of Trade, which have already been productive of much benefit to the public in the information supplied.

Since the foregoing was written I have had the advantage of hearing Mr. Caird read an interesting paper upon our Food Resources before the Statistical Society of London, in which, while reviewing some of the facts displayed in the Agricultural Returns, and showing, with his usual ability, the capabilities of statistics when judiciously employed, he expressed an opinion adverse to the publication by the Government of any *estimates* of agricultural produce, for the reason that there would be a danger of such *estimates* being mistaken for actual facts by some, who would be greatly misled thereby. An official publication ought, it was

argued, to contain nothing but facts, and the Board of Trade was therefore advised to continue giving only the acreage under the several crops, leaving those who are interested in the subject to *estimate* the produce for themselves. The following quotation from an article in the 'Daily News' (March 27th), on Mr. Caird's paper, shows, for example, how the rule for estimating the total yield of any given harvest is reduced by him to a very simple formula:—

"The agricultural Returns for the year will be published, after a little experience has made the collection of them more easy, in August or September. These returns will give the number of acres laid down in each crop. The rate of yield must be ascertained by the public for themselves; but as 'the great bulk of wheat in this country is produced along the eastern and southern seaboard, from York to Devon, and the adjoining inland counties, extending over little more than three degrees of latitude, within which climate and seasons are very much alike, a few careful trials will very accurately reveal the yield over the whole region.' The truth of this has been shown by the trials made annually in Hertfordshire by Mr. Lawes, which for more than twenty years have proved 'a wonderfully accurate test of the general yield of the country.' As soon, therefore, as the acreage is known, it has only to be multiplied by the yield, as tested in a few typical localities, and the result of the harvest will be obtained almost as soon as it is reaped."

Mr. Caird, I think, scarcely does himself justice in assuming that what long experience, practice, and judgment have enabled him to accomplish with so much facility and accuracy in the way of estimates and calculations, would come naturally to others whose opportunities of collecting and marshalling facts have perhaps been comparatively few. *Official estimates* have at any rate this advantage—they are based usually on a far more extensive series of facts than would be available for use by any private individual, and they are free from any possible suspicion that they have been framed to support any particular interest. And as regards *estimates* of produce, I cannot but regard them as most essential if the farmers or the public at large are to reap the full benefit derivable from agricultural returns. A farmer in Devon or Cornwall may know very well the average yield of the wheat crops in his district, and knowing also the acreage under wheat, he can calculate the quantity locally produced; but will that satisfy him? May he not desire also to know the yield in the Northern or Midland counties, and in fact to get, as correctly as possible, at the aggregate produce of the whole country, so as to be able to reckon upon the consequent probabilities of the corn market, particularly if he is in doubt as to whether he ought to sell or keep back his own wheat? I cannot avoid the conclusion that in these days of rapid communication the estimated aggregate produce is of more importance to growers than the estimated produce of particular districts; and as the former can only be properly ascertained by collation of estimates made for each district, it is difficult to understand how it could be arrived at

and made available for public use, unless it be included in the scheme of Returns published by the Board of Trade. Mr. Caird objects to *official estimates*, yet estimates have admittedly, and from necessity, been freely employed in the Returns already published; and I am free to assert that were such of our Public Departments as are in the habit of issuing Statistical Reports to adopt the rule of giving nothing but facts, those documents would at once be deprived of a large measure of their interest and value to the public. I do not think there is much probability of an intelligent person being misled by *estimates* if they are clearly declared so to be, and the data upon which they rest are given; of course if they are disguised as apparent facts they forthwith become a source of fallacy and error.

But I cannot do better than quote here a paragraph taken from that part of the programme of the London Statistical Congress (1860), which was drawn up and signed by Mr. Caird himself, defining most clearly the relation in which acreage returns and produce *estimates* stand toward each other:—

"The advantage of agricultural statistics is acknowledged more or less by all civilised communities. But statistics being statements of fact, there has always been found, in regard to those of agriculture, a difficulty in the necessity that was generally felt of supplying, along with the ascertained extent of land under various crops, an estimate of the probable yield. In publishing such returns, therefore, a distinction should be observed between that which is fact and that which is estimate. Nor is there any practical difficulty in this, for, while the facts (viz., the ascertained acreage) should be given as a reliable basis for estimating the yield of crops, an estimate of that yield ought also to be afterwards supplied, which, being an estimate merely, will be accepted only in so far as it may accord with each man's private judgment."

And as to the utility as well as the perfect practicability of getting these estimates of produce, I think the example afforded by the Irish Returns for a series of years is conclusive. Mr. Donnelly's *estimates* for the years 1865 and 1866 will be found in the annexed Table V., with explanatory remarks upon the plan adopted for securing trustworthy information.

In conclusion, I may perhaps be allowed to quote another sentence from the article in the 'Daily News,' already referred to:—

"The Returns, Mr. Caird tells us, also afford most valuable information upon many other points. Among these he instances the relative productiveness of large and small farms, and of corn and grass, the importance and wealth of certain counties as compared with others, and the extent of farms as influenced by climate and soil."

I presume that herein Mr. Caird is speaking prophetically about what the Returns may be expected to include at some future time, inasmuch as in their present form they do not throw the smallest light upon several of the points referred to.

TABLE I.—ACREAGE under CULTIVATION, and LIVE STOCK in each County of

COUNTIES.	Years.	Estimated Population on 1st January, 1867.	Total Area in Statute Acres.	ACREAGE: Acreage not Accounted for.	ACREAGE: Total Acreage Returned as under Cultivation.
ENGLAND.					
SOUTH EASTERN COUNTIES:					
1. Surrey	1866 1867	930,105	478,792	200,059 202,977	278,733 275,815
2. Kent	1866 1867	811,648	1,039,419	327,593 319,279	711,826 720,140
3. Sussex	1866 1867	380,126	936,911	359,984 308,996	576,927 627,915
4. Hampshire	1866 1867	532,033	1,070,216	430,214 394,725	640,002 675,491
5. Berkshire	1866 1867	179,912	451,210	106,004 94,658	345,206 356,552
SOUTH MIDLAND COUNTIES:					
6. Middlesex	1866 1867	2,414,022	180,136	70,257 71,226	109,879 108,910
7. Hertfordshire ..	1866 1867	176,809	391,141	68,152 59,645	322,989 331,496
8. Buckinghamshire	1866 1867	170,494	466,932	89,754 78,826	377,178 388,106
9. Oxfordshire	1866 1867	171,234	472,717	87,339 75,306	385,378 397,411
10. Northamptonshire	1866 1867	236,993	630,358	107,622 96,556	522,736 533,802
11. Huntingdonshire ..	1866 1867	64,288	229,544	37,127 23,237	192,417 206,307
12. Bedfordshire ..	1866 1867	141,909	295,582	53,292 45,967	242,290 249,615
13. Cambridgeshire ..	1866 1867	170,844	525,182	62,042 56,475	463,140 468,707
EASTERN COUNTIES:					
14. Essex	1866 1867	426,767	1,060,549	270,908 270,394	789,641 790,155
15. Suffolk	1866 1867	336,987	947,681	207,277 204,354	740,404 743,327
16. Norfolk	1866 1867	430,319	1,354,301	345,214 312,158	1,009,087 1,042,143

* Under this head are included all corn and green crops, hops, clover, artificial grasses under rotation, and bare fallow.

GREAT BRITAIN in 1866 and 1867 (condensed from the Agricultural Returns).

		LIVE STOCK.			
Arable.*	Pasture.†	Total Live Stock.	Cattle.	Sheep.	Pigs.
185,741	92,992	215,286	32,036	149,540	33,710
182,375	93,440	188,674	35,302	114,503	38,869
432,003	279,823	856,730	55,176	731,243	70,311
431,860	288,280	1,207,121	68,137	1,063,414	75,570
367,396	209,531	602,368	74,670	485,056	42,642
388,304	239,611	695,235	86,705	557,390	51,140
517,469	122,533	748,075	48,688	619,598	79,789
529,719	145,772	718,891	49,490	587,381	82,020
248,942	96,264	398,730	30,149	327,316	41,265
248,175	108,377	423,307	29,706	342,774	50,827
38,736	71,143	94,826	17,501	62,650	14,675
36,842	72,068	82,117	18,722	48,272	15,123
236,800	86,189	275,371	23,202	217,930	34,239
241,097	90,399	282,889	23,784	217,099	42,006
205,986	171,192	354,121	51,840	263,015	39,266
207,094	181,012	459,819	57,448	349,474	52,897
262,644	122,734	417,811	42,135	333,304	42,372
266,639	130,772	474,565	41,615	374,809	58,141
270,946	251,790	548,465	74,262	435,837	38,366
271,709	262,093	702,781	96,114	556,712	49,955
140,360	52,057	162,090	17,667	117,821	26,602
151,071	55,236	209,773	20,534	159,423	29,816
174,416	67,874	242,559	25,513	180,250	36,796
176,365	73,250	258,824	25,004	192,835	40,985
392,437	70,703	344,992	31,731	255,036	58,225
394,858	73,849	423,148	35,581	321,699	65,868
628,947	160,694	535,692	54,310	378,705	102,677
628,444	161,711	648,020	61,257	461,013	125,755
596,993	143,411	597,194	55,767	407,929	133,498
604,040	139,287	739,563	55,888	530,184	153,491
800,215	208,872	804,945	92,386	596,683	115,876
828,054	214,089	1,024,054	103,272	776,333	144,449

† Exclusive of heath or mountain land.

TABLE I.—ACREAGE under CULTIVATION, and LIVE STOCK in each County of GREAT

COUNTIES.	Years.	Estimated Population on 1st January, 1867.	Total Area in Statute Acres.	ACREAGE. Acreage not Accounted for.	Total Acreage Returned as under Cultivation.
ENGLAND—*continued.*					
SOUTH WESTERN COUNTIES:					
17. Wiltshire	1866 1867	246,536	865,092	228,306 162,718	636,786 702,374
18. Dorsetshire	1866 1867	191,469	632,025	233,426 203,611	398,599 428,414
19. Devonshire	1866 1867	594,524	1,657,180	727,940 675,558	929,240 981,622
20. Cornwall	1866 1867	377,569	873,600	437,529 402,311	436,071 471,289
21. Somersetshire ..	1866 1867	445,423	1,047,220	311,616 275,125	735,604 772,095
WEST MIDLAND COUNTIES:					
22. Gloucestershire ..	1866 1867	501,955	805,102	206,831 195,527	598,271 609,575
23. Herefordshire ..	1866 1867	128,693	534,823	139,876 135,066	394,947 399,757
24. Shropshire	1866 1867	247,890	826,055	204,439 191,204	621,616 634,851
25. Staffordshire ..	1866 1867	840,023	728,468	179,806 157,159	548,662 571,309
26. Worcestershire ..	1866 1867	326,375	472,165	103,784 96,079	368,381 376,086
27. Warwickshire ..	1866 1867	618,689	563,946	119,228 107,178	444,718 456,768
NORTH MIDLAND COUNTIES:					
28. Leicestershire ..	1866 1867	241,587	514,164	81,740 61,330	432,424 452,834
29. Rutlandshire ..	1866 1867	21,242	95,805	20,900 17,055	74,905 78,750
30. Lincolnshire	1866 1867	415,157	1,775,457	387,631 367,791	1,387,826 1,407,666
31. Nottinghamshire ..	1866 1867	308,225	526,076	108,574 98,803	417,502 427,273
32. Derbyshire	1866 1867	366,941	658,803	194,883 181,740	463,920 477,063

* Under this head are included all corn and green crops, hops, clover, artificial grasses under rotation, and bare fallow.

BRITAIN in 1866 and 1867 (condensed from the Agricultural Returns)—*continued.*

		LIVE STOCK.			
Arable.*	Pasture.†	Total Live Stock.	Cattle.	Sheep.	Pigs.
412,982	223,804	735,558	77,724	596,822	61,012
415,697	286,677	875,971	75,228	725,585	75,158
223,081	175,518	601,301	70,002	492,623	58,676
221,773	206,641	607,291	64,028	495,999	47,264
618,368	310,872	1,047,678	184,077	769,126	94,475
638,760	342,862	1,158,117	190,843	864,279	102,995
340,581	95,490	497,621	133,652	300,049	63,920
349,067	122,222	611,578	135,154	408,764	67,660
276,916	458,688	885,991	173,547	636,975	75,469
285,629	486,466	993,315	175,835	718,627	98,853
328,267	270,004	504,137	96,831	356,373	50,933
327,439	282,136	639,492	98,577	461,160	79,755
194,353	200,594	347,640	65,184	257,196	25,260
194,606	205,151	450,752	66,145	348,141	36,466
310,643	310,973	494,494	107,208	327,612	59,674
316,725	318,126	689,070	110,718	500,055	78,297
228,727	319,935	387,201	107,298	231,936	47,967
230,260	341,049	541,399	113,809	359,721	67,869
200,733	167,648	286,629	45,789	204,154	36,686
201,483	174,603	366,687	46,874	265,718	54,095
234,804	209,914	389,740	67,249	285,878	36,613
234,492	222,276	534,828	75,768	402,416	56,644
175,111	257,313	402,919	89,115	290,554	23,250
178,277	274,557	616,867	115,048	462,953	38,866
39,900	35,005	91,160	11,651	75,755	3,754
42,643	36,107	128,561	12,917	109,726	5,918
1,002,259	385,567	1,349,020	169,294	1,088,204	91,522
1,005,518	402,148	1,945,929	163,304	1,652,167	130,458
277,068	140,434	341,780	67,165	245,532	29,083
282,124	145,149	424,554	65,574	319,707	39,273
151,994	311,926	320,769	113,195	176,122	31,452
153,147	323,916	426,668	120,983	258,473	47,212

† Exclusive of heath or mountain land.

TABLE I.—ACREAGE under CULTIVATION, and LIVE STOCK in each County of GREAT

COUNTIES.	Years.	Estimated Population on 1st January, 1867.	Total Area in Statute Acres.	ACREAGE. Acreage not Accounted for.	Total Acreage Returned as under Cultivation.*
ENGLAND—*continued.*					
NORTH WESTERN COUNTIES:					
33. Cheshire	1866 1867	536,364	707,078	225,225 211,461	481,853 495,617
34. Lancashire	1866 1867	2,692,306	1,219,221	510,394 489,329	708,827 729,892
YORKSHIRE:					
35. West Riding	1866 1867	1,623,530	1,709,307	615,155 564,770	1,094,152 1,144,537
36. East Riding (*with York*)	1866 1867	295,021	771,139	159,055 144,346	612,084 626,793
37. North Riding ..	1866 1867	264,182	1,350,121	589,343 576,144	760,778 773,977
NORTHERN COUNTIES:					
38. Durham	1866 1867	591,575	622,476	222,910 232,920	399,566 389,556
39. Northumberland ..	1866 1867	367,945	1,249,299	592,310 587,968	656,989 661,331
40. Cumberland	1866 1867	211,115	1,001,273	498,242 485,901	503,031 515,372
41. Westmoreland ..	1866 1867	62,318	485,432	271,556 263,482	213,876 221,950
WALES.					
42. Monmouthshire ..	1866 1867	185,350	368,399	160,123 158,686	208,276 209,713
SOUTH WALES:					
43. Glamorganshire ..	1866 1867	380,754	547,494	314,260 301,286	233,234 246,208
44. Carmarthenshire ..	1866 1867	112,469	606,331	279,938 131,393	326,393 474,938
45. Pembrokeshire ..	1866 1867	97,526	401,691	161,639 144,532	240,052 257,159
46. Cardiganshire ..	1866 1867	73,089	443,387	240,899 218,271	202,488 225,116
47. Brecknockshire ..	1866 1867	61,714	460,158	277,676 286,372	182,482 173,786
48. Radnorshire ..	1866 1867	25,772	272,128	146,067 136,910	126,061 135,218

* Under this head are included all corn and green crops, hops, clover, artificial grasses under rotation, and bare fallow.

Britain in 1866 and 1867 (condensed from the Agricultural Returns)—*continued.*

		LIVE STOCK.			
Arable.*	Pasture.†	Total Live Stock.	Cattle.	Sheep.	Pigs.
179,114	302,739	247,725	93,044	96,989	57,692
181,972	313,645	448,999	112,998	266,074	69,927
234,374	474,453	470,542	202,552	217,615	50,375
230,490	499,402	588,549	201,363	337,495	49,691
480,302	613,850	761,585	189,341	500,196	72,048
487,821	656,716	1,119,233	211,175	815,041	93,017
471,064	141,020	534,251	64,809	416,853	52,589
480,944	145,849	669,318	59,512	549,780	60,026
409,152	351,626	634,743	119,233	462,038	53,472
408,594	365,383	895,143	129,915	698,638	66,590
212,979	186,587	213,158	52,322	146,696	14,140
206,422	183,134	278,151	50,915	209,819	17,417
327,165	329,824	738,539	78,431	635,487	24,621
313,934	347,397	972,557	73,779	878,307	20,471
273,592	229,439	545,988	109,225	396,021	40,742
273,760	241,612	664,634	104,184	525,064	35,386
53,945	159,931	287,405	55,328	224,664	7,413
55,584	166,366	385,447	50,653	328,328	6,466
81,205	127,071	181.045	36,735	131,158	13,152
82,874	126,839	238,206	35,168	182,985	20,053
84,453	148,781	237,730	45,911	177,484	14,335
84,267	161,941	294,108	45,099	229,547	19,462
132,731	193,662	213,740	84,106	110,295	19,339
138,254	336,684	273,657	87,829	158,750	27,078
111,213	128,839	154,993	68,842	64,412	21,739
109,199	147,960	186,007	67,083	95,166	23,758
112,536	89,952	172,638	47,384	108,546	16,708
115,095	110,021	206,257	48,551	138,028	19,678
63,429	119,053	249,486	29,604	212,515	7,367
64,720	109,066	343,284	31,186	300,107	11,991
43,363	82,698	214,728	28,066	181,376	5,346
44,114	91,104	280,582	28,156	243,947	8,479

Exclusive of heath or mountain land.

TABLE I.—ACREAGE under CULTIVATION, and LIVE STOCK in each County of GREAT

COUNTIES.	Years.	Estimated Population on 1st January, 1867.	Total Area in Statute Acres.	ACREAGE. Acreage not Accounted for.	ACREAGE. Total Acreage Returned as under Cultivation.
WALES—*continued.*					
NORTH WALES:					
49. Montgomeryshire	1866 1867	66,681	483,323	264,666 254,157	218,657 229,166
50. Flintshire	1866 1867	70,660	184,905	68,810 66,293	116,095 118,612
51. Denbighshire ..	1866 1867	105,804	386,052	164,125 147,459	221,927 238,593
52. Merionethshire ..	1866 1867	39,032	385,291	266,921 262,067	118,370 123,224
53. Carnarvonshire ..	1866 1867	100,495	370,273	199,859 202,590	170,414 167,683
54. Anglesey	1866 1867	53,107	193,453	64,952 63,986	128,501 129,467
ENGLAND AND WALES ..	1866 1867	21,463,597	37,324,883	12,803,472 11,873,357	24,521,411 25,451,526
SCOTLAND.					
SOUTHERN COUNTIES:					
1. Wigtown	1866 1867	41,354	327,906	200,218 194,858	127,688 133,048
2. Kirkcudbright ..	1866 1867	42,138	610,343	457,725 449,427	152,618 160,916
3. Dumfries	1866 1867	74,616	702,953	498,364 478,748	204,589 224,205
4. Roxburgh	1866 1867	55,154	428,494	268,142 244,742	160,352 183,752
SOUTH EASTERN COUNTIES:					
5. Selkirk	1866 1867	10,761	166,524	145,240 145,254	21,284 21,270
6. Peebles	1866 1867	11,582	227,869	190,962 185,507	36,907 42,362
7. Berwick	1866 1867	36,671	302,951	125,671 118,295	177,280 184,656
8. Haddington	1866 1867	38,351	179,142	72,234 71,785	106,908 107,357
9. Edinburgh	1866 1867	282,488	234,925	120,656 111,856	114,269 123,069
10. Linlithgow	1866 1867	43,909	81,113	26,439 27,693	54,674 53,420

* Under this head are included all corn and green crops, hops, clover, artificial grasses under rotation, and bare fallow.

BRITAIN in 1866 and 1867 (condensed from the Agricultural Returns)—*continued.*

		LIVE STOCK.			
Arable.*	Pasture.†	Total Live Stock.	Cattle.	Sheep.	Pigs.
97,560	121,097	299,732	58,628	220,241	20,863
100,482	128,684	365,133	59,510	277,059	28,564
66,815	49,280	69,349	19,383	35,106	14,860
67,880	50,732	103,001	21,153	64,580	17,268
125,245	96,682	223,789	46,695	150,565	26,529
127,542	111,051	285,951	46,438	212,398	27,115
44,659	73,711	276,137	33,343	235,091	7,703
46,013	77,211	335,602	33,284	293,697	8,621
72,246	98,168	202,329	44,072	139,317	18,940
73,955	93,728	226,866	42,414	164,180	20,272
72,703	55,798	87,017	35,427	33,715	17,875
75,290	54,177	101,168	33,835	49,702	17,631
14,265,663	10,255,748	22,899,542	3,848,435	16,793,204	2,257,903
14,433,492	11,018,034	28,811,718	4,013,564	22,025,498	2,772,656
97,843	29,845	164,645	35,703	118,669	10,273
102,143	30,905	183,026	34,527	140,076	8,423
90,741	61,877	316,414	34,658	271,467	10,289
94,587	66,329	404,320	34,231	361,428	8,661
132,039	72,550	434,462	44,364	371,486	18,612
134,610	89,595	555,445	43,287	494,853	17,305
128,961	31,391	332,715	16,084	310,537	6,094
129,087	54,665	495,548	14,547	476,025	4,976
15,735	5,549	103,575	2,027	100,885	663
15,411	5,859	169,777	2,239	167,032	506
28,401	8,506	133,021	5,970	125,831	1,220
28,846	13,516	186,936	4,966	180,796	1,174
152,415	24,865	216,824	15,192	193,288	8,344
153,645	31,011	301,071	14,091	280,560	6,420
94,784	12,124	108,719	9,659	91,414	7,646
93,951	13,406	120,491	7,599	108,148	4,744
91,230	23,039	136,101	13,013	113,479	9,609
89,826	33,243	175,882	15,389	153,704	6,789
39,136	15,538	34,265	8,029	23,070	3,166
39,399	14,021	42,312	10,443	28,729	3,140

† Exclusive of heath or mountain land.

TABLE I.—ACREAGE under CULTIVATION, and LIVE STOCK in each County of GREAT

COUNTIES.	Years.	Estimated Population on 1st January, 1867.	Total Area in Statute Acres.	ACREAGE. Acreage not Accounted for.	Total Acreage Returned as under Cultivation.
SCOTLAND—*continued.*					
SOUTH WESTERN COUNTIES:					
11. Lanark	1866 1867	702,131	568,867	369,734 361,291	199,133 207,576
12. Ayr	1866 1867	204,285	735,262	475,423 443,289	259,839 291,973
13. Renfrew	1866 1867	174,957	158,268	81,108 75,836	77,160 82,432
WEST MIDLAND COUNTIES:					
14. Bute	1866 1867	16,169	109,375	91,108 89,079	18,267 20,296
15. Argyle	1866 1867	78,006	2,083,126	1,971,770 1,963,397	111,356 119,729
16. Dumbarton	1866 1867	58,313	204,800	165,000 164,713	39,800 40,087
17. Stirling	1866 1867	90,628	295,875	200,396 194,874	95,479 101,001
EAST MIDLAND COUNTIES:					
18. Clackmannan ..	1866 1867	19,300	29,440	15,326 16,068	14,114 13,372
19. Kinross	1866 1867	8,219	49,812	18,943 18,882	30,869 30,930
20. Fife	1866 1867	155,727	328,427	108,259 110,292	220,168 218,135
21. Perth	1866 1867	130,801	1,814,063	1,497,297 1,466,468	316,766 347,595
22. Forfar	1866 1867	214,293	568,750	340,555 338,357	228,195 230,393
NORTH EASTERN COUNTIES:					
23. Kincardine	1866 1867	34,808	252,250	140,294 136,957	111,956 115,293
24. Aberdeen	1866 1867	229,025	1,260,625	710,039 706,033	550,586 554,592
25. Banff	1866 1867	58,700	439,219	285,030 286,011	154,189 153,208
26. Elgin	1866 1867	46,334	340,000	243,284 237,833	96,716 102,167

* Under this head are included all corn and green crops, hops, clover, artificial grasses under rotation, and bare fallow.

BRITAIN in 1866 and 1867 (condensed from the Agricultural Returns)—*continued.*

		LIVE STOCK.			
Arable.*	Pasture.†	Total Live Stock.	Cattle.	Sheep.	Pigs.
129,424	69,709	225,212	56,206	160,014	8,992
129,898	77,678	289,369	58,094	221,267	10,008
155,751	104,088	352,019	75,544	262,973	13,502
165,055	126,918	433,005	79,840	338,562	14,603
44,667	32,493	50,370	21,513	26,503	2,354
45,637	36,795	60,681	23,423	34,911	2,347
14,706	3,561	43,820	8,252	34,318	1,250
14,595	5,701	45,540	7,765	36,638	1,137
58,362	52,994	764,154	57,831	700,621	5,702
63,808	55,921	952,124	56,908	890,131	5,085
26,784	13,016	65,165	10,564	53,405	1,196
25,889	14,198	84,728	12,387	71,139	1,202
65,624	29,855	111,461	21,396	86,392	3,673
66,400	34,601	139,028	24,261	111,746	3,021
11,058	3,056	12,833	2,104	9,468	1,261
10,224	3,148	17,437	2,629	12,905	1,903
24,590	6,279	27,764	4,028	22,450	1,286
24,031	6,899	41,505	5,003	35,743	759
186,088	34,080	135,175	27,297	93,685	14,193
185,041	33,094	129,951	30,483	90,063	9,405
246,932	69,834	578,567	66,150	494,635	17,782
245,429	102,166	760,743	69,898	677,654	13,191
210,738	17,457	200,166	28,645	156,653	14,868
208,710	21,683	201,651	39,941	153,476	8,234
104,375	7,581	67,371	21,529	41,073	4,769
108,026	7,267	74,463	23,321	47,695	3,447
525,246	25,340	257,506	133,451	109,292	14,763
530,986	23,606	337,382	146,297	176,959	14,126
144,965	9,224	98,122	36,542	55,409	6,171
144,976	8,232	109,860	38,866	65,498	5,496
88,938	7,778	95,256	20,406	69,078	5,772
91,457	10,710	108,983	20,847	83,278	4,858

† Exclusive of heath or mountain land.

TABLE I.—ACREAGE under CULTIVATION, and LIVE STOCK in each County of GREAT

COUNTIES.	Years.	Estimated Population on 1st January, 1867.	Total Area in Statute Acres.	ACREAGE. Acreage not Accounted for.	Total Acreage Returned as under Cultivation.
SCOTLAND—*continued.*					
N. EASTRN COUNTIES—*cont'.*					
27. Nairn	1866 1867	8,502	137,500	116,328 113,543	21,172 23,957
NORTH WESTERN COUNTIES:					
28. Inverness	1866 1867	80,853	2,723,501	2,605,040 2,611,555	118,461 111,946
29. Ross and Cromarty	1866 1867	81,646	2,016,375	1,912,902 1,895,390	103,473 120,985
NORTHERN COUNTIES:					
30. Sutherland	1866 1867	23,841	1,207,188	1,191,525 1,184,230	15,663 22,958
31. Caithness	1866 1867	43,584	455,708	364,249 351,417	91,459 104,291
32. Orkney	1866 1867	32,935	598,726	(1866) 471,756	77,077 82,255
33. Shetland..	1866 1867	32,010		(1867) 466,145	49,893 50,326
TOTAL OF SCOTLAND ..	1866 1867	3,162,091	19,639,377	15,481,017 15,259,825	4,158,360 4,379,552

* Under this head are included all corn and green crops, hops, clover, artificial grasses under rotation, and bare fallow.

BRITAIN in 1866 and 1867 (condensed from the Agricultural Returns)—*continued.*

		LIVE STOCK.			
Arable.*	Pasture.†	Total Live Stock.	Cattle.	Sheep.	Pigs.
17,443	3,729	26,500	5,232	19,862	1,406
21,420	2,537	29,420	5,297	23,007	1,116
79,170	39,291	571,928	45,334	522,006	4,588
79,937	32,009	720,314	45,066	670,886	4,362
90,423	13,050	338,352	36,109	293,754	8,489
102,235	18,750	406,914	34,185	366,908	5,821
12,994	2,669	176,780	11,262	164,060	1,458
18,375	4,583	209,534	10,413	197,477	1,644
73,240	18,219	105,687	19,999	82,676	3,012
77,525	26,766	118,355	20,114	95,205	3,036
65,027	12,050	47,852	22,674	20,780	4,398
69,014	13,241	59,903	22,823	31,648	5,432
17,464	32,429	79,393	20,634	55,844	2,915
16,094	34,232	95,682	20,290	69,456	5,936
3,265,294	893,066	6,412,194	937,401	5,255,077	219,716
3,326,267	1,053,285	8,061,380	979,470	6,893,603	188,307

* Exclusive of heath or mountain land.

TABLE II.—STATEMENT of the POPULATION, AREA, and ACREAGE under CROPS and by their respective *The Area and Acreage are*

DESCRIPTION OF CROPS, &c.	SWEDEN * (in 1867).	NORWAY * (in 1867).	DENMARK PROPER (in 1866).	PRUSSIA * (in 1867).	WURTEMBURG (in 1866).
TOTAL AREA	101,700,000 (exclusive of lakes and rivers).	79,967,736	8,662,937	68,562,743	4,826,823
TOTAL ACREAGE:					
Under CROPS and GRASS (exclusive of Vineyards and Olive Grounds)	10,767,250	—	5,606,601	41,173,913	3,010,598
Under CORN CROPS	3,149,750	492,000	2,380,496	17,947,707	1,314,470
Under GREEN CROPS	367,500†	?	149,127†	5,412,799†	324,269†
BARE FALLOW ..	1,000,000	?	440,453	6,253,556	248,644
CLOVER and other GRASSES under ROTATION	1,250,000	?	329,775	5,127,916	254,587
PERMANENT PASTURE	5,000,000	?	2,306,750	6,431,935	868,628
CORN CROPS:					
Wheat and Spelt ..	95,000	13,750	119,845	2,848,842	543,586
Barley or Bere	587,500	127,250	683,245	2,279,074	234,679
Oats	1,396,250	267,000	826,140	4,558,148	320,550
Rye	712,500	25,750	518,320	6,837,222	102,864
Beans, Peas, and other Kinds of Grain ..	358,500	58,250	232,946	1,424,421	112,791
GREEN CROPS:					
Potatoes	350,000	67,500	84,809	3,418,610	169,045
Turnips, Carrots, Mangold, Beet, Rape, Colza, &c.	17,500	?	64,318	1,994,189	155,224
POPULATION	4,160,677	1,701,817	1,717,802	18,491,220	1,748,328
TOTAL LIVE STOCK ..	3,894,394	2,751,969	3,449,425	28,698,555	1,942,077
Cattle	1,924,354	952,158	1,193,861	6,111,994	974,917
Sheep and Lambs ..	1,589,875	1,703,814	1,874,052	19,329,030	703,656
Pigs	380,165	95,997	381,512	3,257,531	263,504

* Estimate Returns. † Includes flax.

‡ Including green bean and winter fodder.

§ The results of the Return taken in 1866 are not yet published.

‖ Includes 18,990,180 acres of Indian corn.

Note.—The Acreage Returns for Holland include 56,770, and for Austria 90,233 acres under flax.

For RUSSIA there are no Returns of Acreage under Crops; the Live Stock comprised in the European and Asiatic parts of the Empire numbered 25,444,000 cattle, 45,130,800 sheep, and 10,097,000 pigs, taking the average of the years 1859-63.

For SWITZERLAND there are no Returns of the Acreage under each kind of Crop; in 1855, the aggregate Acreage under Corn and Green Crops was 1,435,555 acres; and 3,527,431 acres under grass, meadows, and pasture. The Live Stock in 1866 numbered 992,895 cattle, 445,400 sheep, and 304,191 pigs.

GRASS, in various FOREIGN COUNTRIES, according to RETURNS furnished
STATISTICAL DEPARTMENTS.
stated in English Statute Acres.)

BAVARIA (in 1863).	HOLLAND (in 1866).	BELGIUM § (in 1856).	FRANCE (in 1862).	AUSTRIA exclusive of Galicia (except Cracow), Bukowina, the Tyrol, and the Military Frontier (in 1866).	UNITED STATES* (in 1867).
18,776,343	8,209,992	7,211,000	132,787,000	116,051,441	1,804,679,040
11,049,282	—	4,521,386	82,661,408	65,941,608	—
4,576,688	1,346,330	2,484,493	40,273,378	26,384,108	41,184,547
1,009,972†	469,290	709,124†	6,221,243†	1,719,244	?
1,165,080	?	159,112	12,869,655	7,534,019	?
718,695	221,352	396,787	6,931,650	1,302,434	?
3,578,847	?	771,870	16,365,482	28,911,570	Hay, 16,323,852
1,041,035	211,205	804,758	18,683,435	3,662,164	12,304,894
835,456	104,945	110,130	2,717,478	2,755,415	542,175
1,115,015	235,332	541,347	8,319,688	6,573,921	6,894,091
1,449,929	507,138	721,492	4,820,745	6,978,008	1,396,123
135,253	287,710	306,766	5,732,032	6,414,600	20,047,264‖
644,197	273,380	369,850	3,087,017	1,308,148	964,614
365,775	195,910	339,274	3,134,226‡	411,096	Tobacco, 236,363
4,774,515	3,552,665	4,940,570	37,547,000	34,432,890	31,445,080
6,123,826	2,877,909	2,299,552	52,725,355	33,661,786	59,087,641
3,162,387	1,270,893	1,257,649	14,197,360	9,173,472	12,674,968
2,039,983	1,088,016	583,485	33,281,592	16,573,459	32,795,797
921,456	519,000	458,418	5,246,403	7,914,855	13,616,876

For ITALY there are no Returns of the Acreage under each description of Crop. The total area under cultivation is thus divided: Arable Land (including Vineyards) 27,507,650 English acres; Natural and Artificial Meadows, 2,933,590 acres; Permanent Pastures, 13,493,620 acres; Rice Fields, 362,257 acres; Olive Gardens, 1,386,917 acres; and Chestnut Plantations, 1,462,830 acres. The Live Stock in 1867 numbered 3,708,635 cattle, 11,040,339 sheep, and 3,886,731 pigs.

The Returns for SPAIN in 1857 give a total area of 126,759,000 acres, of which 14,987,542 acres were under corn crops, and 20,689,050 acres permanent pasture. The corn crops were thus divided: wheat, 7,311,892 acres; barley, 3,182,100 acres; rye, 2,961,863 acres; beans, peas, &c., 1,531,687 acres. Potatoes occupied 509,503 acres. The Live Stock numbered 2,904,598 cattle, 22,054,967 sheep, and 4,264,817 pigs.

TABLE III.—STATEMENT of the ESTIMATED QUANTITIES, in English Imperial Bushels, of the PRINCIPAL KINDS of CORN and of POTATOES Produced in various Countries, according to the latest Returns.

Description of Crops.	Russia. Average of 1859 to 1863. In Europe.	Russia. Average of 1859 to 1863. In Asia.	Holland (1865).	France (1863).	Austria (1866).	Spain (1857).	Italy (1867).	United States (1860).
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.*	Bushels.	Bushels.	Bushels.
Wheat	Winter Corn.	Winter Corn.	4,679,328	262,435,327*	82,204,128	168,140,692	94,592,212	167,911,777
Barley	509,025,520	10,863,553	4,163,271	59,151,375	84,528,936	76,427,587	20,534,907	15,351,122
Oats			10,228,077	210,315,492	168,428,448	..		167,463,890
Rye	Spring Corn.	Spring Corn.	9,978,600	81,275,634	109,164,456	24,727,483	7,699,865	20,468,339
Beans and Peas	717,651,720	68,564,200	2,342,903	..	8,297,568	..	..	14,610,136
Maize			..	27,676,750	72,884,592	..	44,968,387	813,628,958
Potatoes ..	138,716,470	8,436,982	..	322,232,165	202,197,384	..	26,160,868	148,646,577

* Production of the year 1865: the returns for the other crops are for the year 1863.

TABLE IV.—STATEMENT of the ESTIMATED AVERAGE YIELD in Imperial Bushels per Statute Acre of the PRINCIPAL CORN CROPS in various Countries.

Description of Crops.	Holland (1865).	Belgium (1866).	Austria (1866).	Spain (1857).	France (1852).
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
Wheat:—					
Winter	22·98	20·10	23·15	23·31	15·18
Summer		22·60			15·42*
Barley:—					
Winter	41·30	35·32	30·61	24·27	18·30
Summer		29·10			
Oats	42·74	40·37	25·62	..	21·05
Rye	20·90	24·57	15·63	8·44	12·81
Beans and Peas ..	20·29	22·17	..	..	15·12

* In 1865.

TABLE V.—IRELAND.—ACREAGE under PRINCIPAL CROPS, and ESTIMATED PRODUCE, in 1865 and 1866.

From Tables presented to Parliament (Session of 1867) *on* 'Agricultural Statistics, Ireland.'

Crops.	Acreage Cultivated.		*Estimated* Produce per Statute Acre in		Total *Estimated* Produce in	
	1865.	1866.	1865.	1866.	1865.	1866.
Wheat	266,989	299,190	13·0 cwts.	11·3 cwts.	826,783 qrs.	805,710 qrs.
Oats	1,745,228	1,699,695	12·3 ,,	12·0 ,,	7,659,727 ,,	7,284,835 ,,
Barley	177,102	150,293	14·9 ,,	15·7 ,,	732,017 ,,	654,980 ,,
Bere	10,091	10,021	14·8 ,,	15·3 ,,	13,989 ,,	11,016 ,,
Rye			10·4 ,,	10·3 ,,	18,364 ,,	19,721 ,,
Potatoes	1,066,260	1,050,353	3·6 tons.	2·9 ,,	3,865,990 tons.	3,068,594 tons.
Turnips	334,212	317,198	9·9 ,,	11·9 ,,	3,301,683 ,,	3,786,462 ,,
Mangold Wurzel	14,389	20,082	13·3 ,,	12·5 ,,	191,937 ,,	250,322 ,,
Cabbage	33,622	36,531	10·4 ,,	10·5 ,,	350,252 ,,	382,363 ,,
Hay	1,678,493	1,601,423	1·8 ,,	1·8 ,,	3,068,707 ,,	2,878,622 ,,
Flax	251,433	263,507	25·2 stones of 14 lbs.	24·9 stones of 14 lbs.	39,561 ,,	40,991 ,,

Note.—The following remarks by the Registrar-General of Ireland explain how the above *estimates* were obtained:—

"The returns of the *average* produce of the crops were, as in former years, procured by enumerators selected from the constabulary for their intelligence. The information was obtained by them from various persons, principally farmers occupying land in the several electoral divisions—the names and addresses of the parties who gave the information being stated on the forms.

On the Returns being received at this office, they were examined and copied by electoral divisions, and forwarded by me to the Chairman and Board of Guardians of each Union for revision; and I have the satisfaction to state, that out of the entire number of electoral divisions (3438) the returns for 2593 have been revised by the Guardians."

A subsequent return gives the *estimated* value of live stock in Ireland on the assumed rates of 8*l.* each for horses, 6*l.* 10*s.* for cattle, 22*s.* for sheep, and 25*s.* for pigs.

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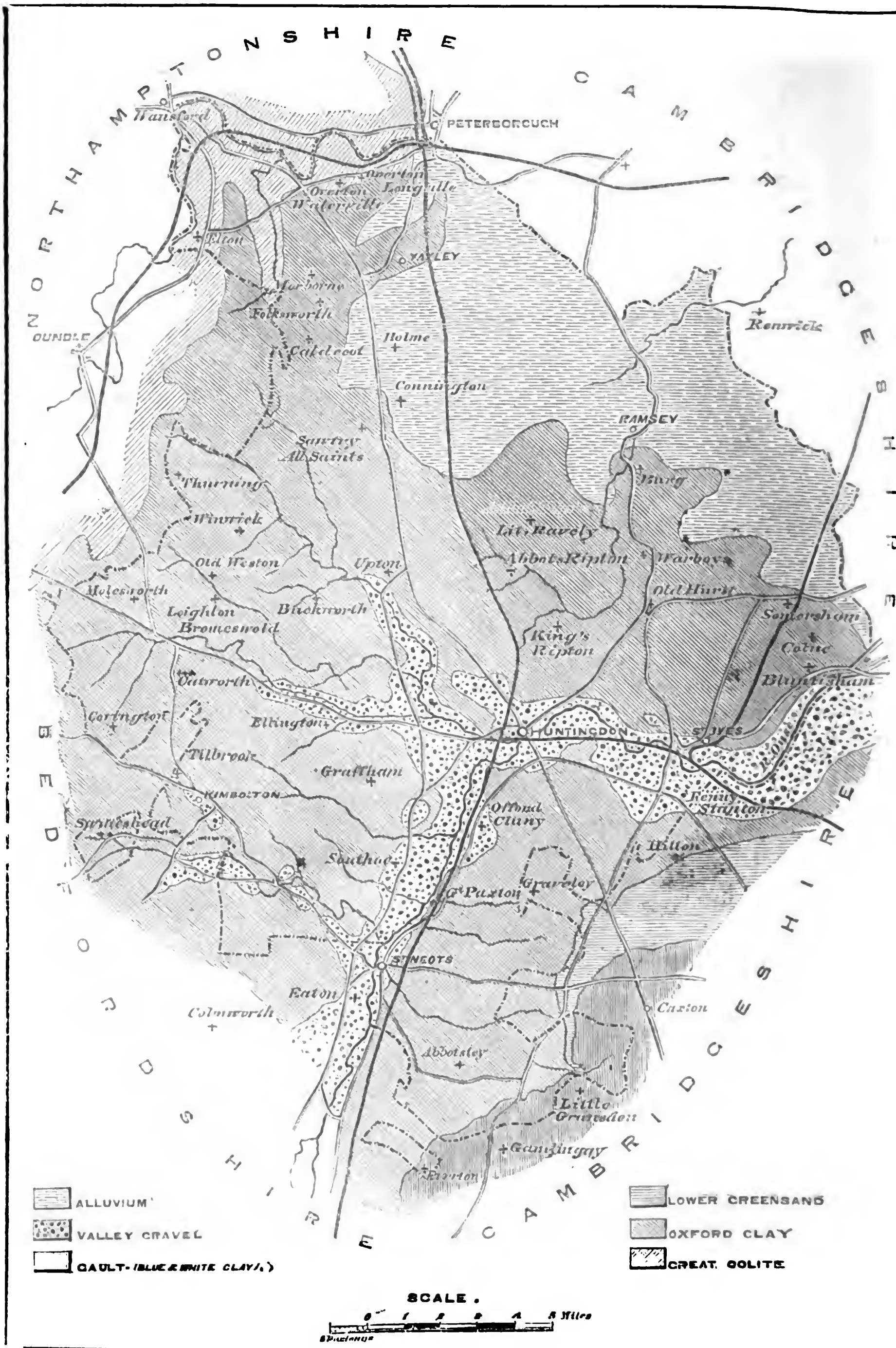
JOHN MURRAY, ALBEMARLE STREET.
1868.

THESE EXPERIMENTS, IT IS TRUE, ARE NOT EASY; STILL THEY ARE IN THE POWER OF EVERY THINKING HUSBANDMAN. HE WHO ACCOMPLISHES BUT ONE, OF HOWEVER LIMITED APPLICATION, AND TAKES CARE TO REPORT IT FAITHFULLY, ADVANCES THE SCIENCE, AND, CONSEQUENTLY, THE PRACTICE OF AGRICULTURE, AND ACQUIRES THEREBY A RIGHT TO THE GRATITUDE OF HIS FELLOWS, AND OF THOSE WHO COME AFTER. TO MAKE MANY SUCH IS BEYOND THE POWER OF MOST INDIVIDUALS, AND CANNOT BE EXPECTED. THE FIRST CARE OF ALL SOCIETIES FORMED FOR THE IMPROVEMENT OF OUR SCIENCE SHOULD BE TO PREPARE THE FORMS OF SUCH EXPERIMENTS, AND TO DISTRIBUTE THE EXECUTION OF THESE AMONG THEIR MEMBERS.

VON THAER, *Principles of Agriculture.*

LONDON: PRINTED BY WILLIAM CLOWES AND SONS, DUKE STREET, STAMFORD STREET, AND CHARING CROSS.

GEOLOGICAL MAP OF HUNTINGDONSHIRE.



XVI.—*On the Farming of Huntingdon.* By Gilbert Murray.

Prize Essay.

This county is divided into four hundreds—Norman Cross, to the north, containing twenty-five parishes; Kimbolton, on the west, thirty parishes; St. Neot's, to due south, twenty-three parishes. The length from north to south is about 30 miles; from east to west 23 miles. The extent is about 372 square miles, or 229,544 acres. The population was in 1831, 53,192; and in 1861, 64,250: showing an increase of barely 20 per cent. during a period of thirty years. The chief town, Huntingdon, situated on the river Ouse, contains a population of 3,816, and returns two members to Parliament. The chief market towns are Huntingdon, St. Neot's, Ramsay, St. Ives, and Kimbolton.

Huntingdonshire is well situated both for land and water carriage. The river Ouse enters the shire on the south, passes St. Neot's, flows north to Huntingdon, and thence in an easterly direction to St. Ives, on its course to the Wash. It is navigable for large boats throughout the whole length of its course through the shire. The Nene, another navigable river, wends along the northern border of the county by Peterborough, and enters into the Wash below Wisbeach, in Cambridgeshire. The Great Northern Railway, which enters the county at St. Neot's on the south, and passes almost directly through the middle of the shire to Peterborough on the north, is intersected by a branch of the Great Eastern, which connects Huntingdon and St. Ives with Cambridge. The Midland enters the shire on the south-west from Thrapston, passes Kimbolton, and joins the Great Northern at Huntingdon.

The county is well provided with turnpike-roads, which are kept in an efficient state of repair. The old North road from London to York passes through the county, but is now little used. The parish and occupation roads on the clayland districts are not generally good; burnt clay-ballast being the material principally used in their formation, but where sufficient attention is given to drainage, and gravel to the depth of from 4 to 5 inches is laid on the ballast, very serviceable roads are formed, which, with a little attention, last for many years. Great expense and difficulty in obtaining gravel is the only bar to more extended improvements.

Neither is the county deficient in historical interest. Traces of several Roman stations and encampments still remain, and the great roads, the Ermine Street and Via Devana, passed through the shire. It likewise contained two great abbeys, Ramsey and Sawtry of St. Judith, with castles at Kimbolton and Huntingdon.

In several churches the remains of Norman buildings are still to be traced.

Apart from the fen-lands and the gravel of the Ouse valley, the geological formation of the shire belongs to the Oolitic series, and embraces calcareous grit, Oxford clay, cornbrash, blue limestone, and great oolite.

The agricultural divisions are the gravels of the Ouse valley on the south-east; the fens on the north-east; and the Oxford clay, which extends over a wide area of the middle and western parts of the shire. The other geological formations are of small extent and possess no agricultural interest.

The air in the higher parts of the county is pure and bracing; in the fens mists are prevalent, and the atmosphere is generally charged with moisture, yet the inhabitants are particularly healthy, drainage having quite banished the attacks of ague, so prevalent at one time amongst fenmen. Few trades are carried on, the population being principally employed in the cultivation of the soil and the handicrafts therewith connected, such as brickmaking, malting, milling, brewing, lime-burning, &c.

The Government returns of 1866* give the following as the extent in acres of the different kinds of crops:—

	Acres.
Wheat	43,406
Barley	21,083
Oats	10,889
Rye	635
Beans	13,483
Peas	4,935
Total average under corn	94,431

Green Crops.

	Acres.
Potatoes	2,517
Turnips and swedes	3,445
Mangolds	3,746
Carrots	558
Cabbages, kohl-rabi and rape	4,485
Vetches, Lucerne	5,600
Total in green crops	20,751

	Acres.
Bare fallow or uncropped arable land	13,403
Clovers and other artificial grasses under a regular rotation	11,775
Permanent pasture	52,057
Total number of acres under all kinds of crops, bare fallow and grass	192,417
Woods, waters, roads and waste lands	37,127

* The returns for the year 1867, published since this Essay was written, will be found at pp. 214-247, *supra*.

Of the total extent (140,360 acres) of lands under cultivation—

33 per cent. was under wheat in 1866.
16 per cent. barley.
8 per cent. oats.
9 per cent. beans.
8 per cent. bare fallow.
15 per cent. green crop.
8 per cent. clovers or cultivated grasses.
3 per cent. is devoted to the cultivation of rye and peas.

The *Cattle* in the county on the 5th day of March, 1866, numbered 19,812, being in the proportion of 10·3 to each 100 acres of land under cultivation. The cattle-plague visited this county with great severity, about 11½ per cent. of the whole stock having either died or been sacrificed through the disease. Up to the 3rd March, 1866, 10·83 healthy cattle were killed from having been in contact with diseased animals, or from fear of infection; 1789 died from the fatal effects of the plague; and 467 were killed in different stages of the malady. Neither was this loss the limit of the unfortunate farmer's distress, for as the cattle could not safely be replaced, for a considerable length of time, occupiers were not able to stock their land in the usual way, so as to turn their herbage to proper account.

The number of *Sheep* in the county, in 1866, was 117,821, or 61·2 per 100 acres of the area of land under cultivation.

The *Swine*, of various breeds, or rather a mixture of different varieties, numbered 26,602; a large per-centage to the area. Many of the strong stores, after they have gleaned the stubbles, are sold to the farmers in the dairy counties, to be fattened on whey and barleymeal; and great numbers are yearly fed on the inferior barleys in the county; but unless the price exceeds 10*s*. per score lbs., they leave little behind in the shape of profit; yet as they make a large quantity of good manure, the farmer is generally satisfied if they pay for the food consumed. Breeding has latterly paid much better than feeding.

THE GREAT FEN-LANDS of the county may be said to commence in the parish of Fen Stanton on the south-east, proceeding in an easterly direction round the confines of the county, and embracing parts of the different parishes of Holywell, Needingworth, Bluntisham, Earith, Somersham, Warboys, Ramsey, Sawtry, Connington, Home, Stilton, and Yaxley, terminating at Farcet, on the north, and covering an area upwards of 50,000 acres in extent. The soil of this district is of a black peaty nature, composed almost entirely of vegetable matter, resting on a subsoil of white marly clay, the depth of the peat varying from 3 to 7 or 8 feet. Drainage is effected by open ditches, cut at suitable distances, to convey the water into main ditches or droves. By the withdrawal of water the peat becomes consolidated, and consequently reduced

in bulk, and in order still further to reduce its thickness and get closer to the clay, burning has been practised. To some extent this practice prevails when the land is first reclaimed from a state of nature. As cultivation proceeds, and by the application of manures the growth and feeding off on the land of green crops extends, the burning is discontinued, as by destroying the fertilising effects of the manures it would then be a wasteful operation. After the land has been thoroughly drained, claying the surface, to the depth of from 3 to 4 inches, is the great essential to give the necessary consistency to the soil. This operation is effected by digging through the peat where it does not exceed a depth of from 3 to 4 feet, and producing clay on the spot. A trench 4 feet in width having been opened, the peat is removed until the clay is reached, which is then thrown out of the trench in sufficient quantity to cover the surface-soil on each side to the requisite depth. When a sufficient quantity of clay has been thus thrown out, the peaty soil from the next length is thrown into the vacant space, and the work proceeds in the same way as trenching is generally performed, the peaty soil from the surface taking the place of the clay, and the sides of the trench being levelled down with the spade so as to leave the land in a fit state for the plough. The cost of this operation varies from 50*s.* to 5*l.* per acre. When well done the land is improved to an extent the duration and value of which it is difficult to estimate.

The great drawback to the fen-land farmer is the utter uncertainty of his crops; a single night's frost in spring may blight his prospects and destroy the fruits of many months' toil and expenses. In favourable seasons good crops are grown: but to strangers they are always deceptive, as they seldom turn out either of the quantity or quality which might be supposed from their appearance. Four quarters of wheat and five quarters of barley are about the average of the best seasons. The soft nature of the soil and the large quantities of straw produced preclude the use of the reaping-machine to any extent; indeed the sickle and reaping-hook are seldom used, both wheat and barley being almost invariably mown and tied, at a price varying from 7*s.* to 10*s.* per acre.

The fen-land is mostly cultivated on the four-acre system. First year—green crops. The land when fairly treated produces good crops of rape, turnips, kohl-rabi, and mangold, but is not well suited to the growth of swedes. The best managers generally draw off one-fourth of their roots for consumption by cattle in the yards, and the rest are consumed on the land by sheep, eating also cake or corn. Second-year—barley and seed-clovers do not succeed except where the land has been clayed. Italian rye-grass, which obtains most favour both for mowing and pasture, is very useful in spring, as it invariably produces an early bite for the

newly-lambed ewes, and, with a little cake, increases the quantity and improves the quality of the milk. Third-year—seeds, either grazed or once mown, and afterwards grazed by sheep; the best managers use oil-cake in considerable quantity. Fourth-year—wheat. The whole of the farmyard-manure is applied to the roots, and sometimes supplemented by artificial fertilisers. Most fen-farms have a portion of upland-pasture attached, which is of vast benefit as an outlet for the stock.

The straw is converted into manure by the farm-horses and store cattle: where no upland-pastures belong to the occupation, the farmer either purchases young stock in the autumn, and sells them again in spring to the graziers of Leicester or Northamptonshire, who finish them off on their pastures; or he takes them in for the winter, finding the straw and labour of attendance, whilst the owner of the cattle gives them 4 lbs. per diem of linseed-cake. The Shorthorn breed is most prevalent; great numbers of Irish Shorthorns being wintered in the fens. A good many sheep are bred in the district, and fed off on the heavy crops of cole-seed and roots which the land produces. Large quantities of corn and cake are also used for sheep-feeding. The principal breed is that of the improved Lincolns, which attain to great weights at an early age, and yield a heavy fleece; the soil and climate both being favourable to their development. The farm-buildings, though not generally on an extensive scale, and in some places only temporary erections, are commonly equal to the requirements of the land; the farmhouses are in most instances better than the outbuildings. Thrashing is invariably performed by portable engines, which move from farm to farm as their services are required. Every farm has its chaff-cutter and bean-mill, mostly worked by horse-power. The ploughing is light work for two horses. Iron ploughs of a modern construction are generally in use, with all the modern grubbers, scufflers, and harrows, of the present day; both waggons and carts are used, but the latter are cumbrous, and a better model might easily be substituted. Autumn cultivation is practised to a considerable extent.

The farms are held under a yearly tenancy, at a rent of from 25*s.* to 30*s.* per acre, the landlord paying the drainage tax, which amounts to about 6*s.* per acre. The landlord erects or puts in efficient repair all buildings, gates, fences, &c., on the entry of a new tenant; and the tenant covenants to keep them in a tenantable state on receiving the necessary rough timber at the expense of the proprietor. The usual term of entry is Lady-day. The incoming tenant pays for the seed and labour connected with the wheat-crop, and also, where the work has been properly performed, for all winter ploughing.

The recognised tenant-right extends over a period of three years

in the case of artificial food, and the same for fertilisers; the farmyard manures are valued to an incoming tenant, and hay and straw, if any, at a spending price.

Agricultural labour is here, as elsewhere, becoming more difficult to procure, and the want of better and more extended cottage accommodation begins to be felt. The present wage of ordinary labourers is 12*s.* to 13*s.* per week.

The farm-horses are kept on oats, and cut hay and straw during the winter and spring months; and on green food, tares, or Italian rye-grass, with an allowance of split beans or Indian corn, in the summer; lying loose in the yards, they make a large quantity of manure.

Some farmers keep a large number of store pigs, feeding them on mangold and beans in the winter; and on tares and other green food, with a limited supply of corn, in the summer. They make a large quantity of straw into manure, but seldom leave much direct profit behind.

I. The Fen District.

J. M. Heathcote, Esq., of Connington Castle, who owns the entire parish of Connington, upwards of 3000 acres in extent, is a liberal landlord and spirited improver.

The farm-buildings on this estate are mostly modern, substantial, and suited to the occupations; Mr. Heathcote has likewise erected many very good labourers' cottages, containing a living room, kitchen, and scullery, on the ground floor, and each having three very comfortable bed-rooms, which open separately into the landing and passage. These cottages are mostly built in pairs, a plan whereby a considerable saving in the cost of construction is effected.

Mr. Heathcote has in his own occupation a farm of 400 acres, 200 acres being fen-land, and the other 200 acres sound upland, which, with the exception of 20 acres, is all in permanent pasture; the fen-land is farmed on the four-course system of cropping. Of the ten horses kept, four are constantly employed on the estate. A flock of 120 breeding ewes, of the improved Lincoln type is kept, and for these superior rams, purchased at the celebrated Peterborough fairs, are used. The produce, after a sufficient number of the best ewe teggs have been selected for the purpose of keeping up the flock, are fed off on roots and cake, and are clipped and sold to the butcher during the months of April and May. A number of lambs, bought in the autumn, are wintered and fed off in the spring, when they are replaced by lean shearlings, which are fatted off with cake or corn supplied on the grass. The regular number of sheep kept on this farm is from 450 to 500.

The cattle consists of fourteen breeding cows, mostly pure-bred Shorthorns; and a pure-bred bull is kept, to which the tenants on the property have access at a nominal charge. The stock both in winter and summer average about 100 head, a great part of which are turned out fat either from the pastures or the stalls. Cake is used on the grass for both beasts and sheep; a practice which though not leaving a direct profit in beef and mutton, does so in an improved pasture, which in a few years shows the beneficial effects of this kind of management.

A great number of pigs are bred and fed on this farm; not less than seventy were on the list when the writer visited the yard.

The land produces a large quantity of straw, but this being of inferior quality as fodder, the store beasts always receive with it during the winter an allowance of either roots or oil-cake. The wheat is of fair quality, and in good seasons produces from four to five quarters per acre, but the finer varieties of white do not succeed, as they appear to be peculiarly subject to blight and mildew. The barleys are seldom of a malting quality, being generally lean and light to the bushel; they produce from five to six quarters per acre. Both barley and wheat are put in with the drill; two bushels of the latter and three of the former being the quantities of seed used. The grass land of this parish is good, well managed, and laid out in large enclosures. We are indebted to Mr. Heathcote's steward, Mr. Reid, for much of the foregoing information.

The great modern improver of fen-lands in this county, is W. Wells, Esq., of Holme Wood House, who owns upwards of 8000 acres, chiefly consisting of fen, and whose drainage operations in connexion with the once celebrated Mere of Whittlesea have had the effect, as described in the 21st vol. of the Journal of this Society, of "blotting out from the map of England one of its largest inland sheets of water, converting its bed into the site of thriving farms, and reclaiming the surrounding peat bog." Camden, writing in the seventeenth century, describes the Mere as "that clear lake so full of fish, called Whittlesmere, six miles long and three broad, in a moorish country;" but Parkinson, in his 'General View of the Agriculture of the County,' drawn up for the consideration of the Board of Agriculture, and published in 1811, says that Whittlesea and the other Meres were then "so much filled up with mud, and grown up with aquatic matter, that they were of but very little value as fisheries, either to the proprietors or the public."* Indeed, when taken in hand by Mr. Wells, the Mere was principally noted for the large flocks of wildfowl which frequented its sedgy bogs, and was dreaded by

* Parkinson's 'General View,' p. 20.

the scanty population inhabiting its borders from the pestilential vapours generated and discharged from its stagnant waters.

According, however, to Mr. Wells, in a paper contributed by him to a former volume of this Journal,*—

"Whittlesea Mere, in its ancient state, comprised 1600 acres; but at the time when the works for its draining were commenced, the ordinary water-acreage had diminished to little more than 1000 acres. Around the shores a margin of silty deposit had been formed, which, though often dry, was liable to submersion upon the slightest rise of the water in the Mere. Beyond this margin of silt, which varied in breadth from 50 to 500 yards, and was valuable for the excellent reeds it grew, there extended, especially towards the south and west, where the level of the surrounding land was lowest, a large tract of peat-moss, which, though generally free from water during summer, was constantly flooded in winter. On the north and east sides the level of the surrounding land was higher—sufficiently high indeed to be cultivated by the aid of wind-mills, and approaching more nearly to the borders of the Mere, left less room for either the inner circle of silty reed-shoal, or for the outer circle of peat-moss.

"In addition to the area contained in the Mere, the reed-shoals, and the peat-bog, there was much adjoining low-land, more or less under cultivation, which would naturally be included in any scheme for the draining of the water and waste land on which they bordered."

Various schemes for the drainage of the district had been from time to time propounded, and among others Parkinson, in his General Survey, furnished a plan and detailed particulars "of a new river to be made about 20 feet wide and 4 deep, which by carrying the Nene and other waters into the 40 feet river would drain the greatest part of the Mere itself." Sir John Rennie, on the other hand, proposed to effect the drainage by *means* of the Nene, but various considerations ultimately led to the selection of the Ouse as the grand outlet for the waters. As it was impossible to obtain a natural drainage for the Mere and adjacent lands, it was not until after the passing of the Middle Level Act of 1844, and the construction or enlargement of the great marshland cut and other principal drains that the work, now so happily completed, was deemed practicable. In the summer of 1851, however, says Mr. Wells, it was felt "that the moment for emptying the lake had arrived, and accordingly a point nearest to one of the exterior rivers having been chosen, the bank was cut through, and the long pent-up waters allowed free passage to the sea."

To keep the bed of the Mere free from water, more especially during the winter months, it was deemed necessary to erect a set of Appold's centrifugal pumps, worked by an engine of 25-horse power, and estimated to raise 16,000 gallons a minute, with a 6-foot lift; and fortunate indeed was it for the spirited projector of the works that such provision had been made, for

* 'Journal of the Royal Agricultural Society, vol. xxi. p. 135.

after great labour and expense had been incurred in the endeavour to adapt this newly acquired tract of land to agricultural purposes, on the 12th of November, 1852, the waters of the outer rivers, increased in volume by the heavy rain, effected a breach in the newly formed banks, and in a few hours "Whittlesea Mere was itself again."

Nothing daunted by this untoward event, Mr. Wells took immediate steps for repairing the breach, improving and strengthening the banks in defective parts, and again expelling the water from its ancient bed. How the work was effected may be best stated in Mr. Wells's own words :—

"It was reckoned that 1000 acres were covered again with water to a depth of 2 feet 6 inches, and that if the pump could raise 20,000 gallons a minute, it would take twenty-three days incessant pumping to clear off that amount. This calculation proved correct, and in little more than three weeks the land, but certainly not terra firma, was again everywhere visible.

"The banks having been repaired and fortified, the work of reclamation, and preparing for the cultivation of the soil, was actively resumed. The completion of the main dyke, leading from a point in the high land, not very far from the present Holme Station, 3½ miles long, and averaging 30 feet in width, was an arduous undertaking, owing to the treacherous nature of the bed of the Mere, through which, for nearly 2 miles of its length, it passed. Frequent slips occurred, and continued to occur long after its first completion. From the main dyke a number of smaller dykes branched off, passed through the silty bed of the Mere, penetrated into the surrounding bog, and tapping it in all directions, brought a never-ending flow of water to be discharged by the engine.

"The effect of this network of drains was quickly visible. The bed of the Mere was soon covered with innumerable cracks and fissures, deep and wide, so as to make it a matter of no small difficulty to walk along the surface, while in the surrounding bog the principal effect was the speedy consolidation of its crust, which by the end of the first summer afforded, even in those places which had been long impassable, as safe and firm a footing for a man, as it now does throughout almost its whole extent for a horse."

Since the memorable breach above recorded no further irruption of any serious importance has taken place: the steam pump effectually maintains the drainage of from 3500 to 4000 acres of fen land.

After the stagnant water had been removed, and the land levelled so as to admit of horse-cultivation, the great obstacle in the way of growing corn was the want of consistency in the soil: under the influence of the frosts of winter and the dry winds of March, it became so light that a high wind frequently wafted several inches of it away into the nearest ditch, either carrying the infant wheat plants away with it, or leaving them to linger out a short existence with their tender rootlets exposed to all the vicissitudes of climate. To remedy this defect, Mr. Wells determined to cover the surface of the peat with a coating of clay.

In ordinary cases the surface-dressing of peat with clay is per-

formed without any great expense or difficulty, as a sufficient quantity of clay is found underlying the peat at such a depth only as to admit of its being easily raised. Here, however, the circumstances were totally different. The underlying clay was at too great a depth to render the ordinary mode of proceeding at all consistent with economy. The resources of Mr. Wells were, however, equal to the occasion. On the higher level of his park, at a distance of about 1½ mile, clay was to be had in sufficient quantity for all purposes, if only the cost of carriage permitted its use. Mr. Wells met the difficulty by at once causing a tramway to be constructed, and over this railway in miniature the fertilising material was carried by truck after truck till the whole surface of the Mere was covered to the depth of from 2½ to 6 inches,* at a cost per acre of from 15*l.* to 16*l.* But even this large expenditure has proved a profitable investment of capital, as land formerly worth scarcely one shilling per acre, and yet subject to a drainage rate of six shillings, is now let at from 20*s.* to 30*s.* This, however, was not the only advantage obtained, for in the course of the operations necessary for the acquisition of a sufficient quantity of clay for fertilising purposes, by the removal of the high ridge of land in the centre of the park, the view from the mansion was greatly extended, and several new and pleasing features in the landscape were opened up.

Nothing is more striking than the contrast between the appearance of the reclaimed land and a small tract adjoining, which Mr. Wells has allowed to remain in its original state, in order to show the nature and extent of the improvements effected. The reclaimed land, unlike its sterile neighbour, is capable of producing good crops of roots which are eaten off by sheep; the appearance of the rick-yard when the writer visited the spot in the winter of 1866-7, amply testified to the extent and excellency of the cereals; and the clayed land was occupied by promising seed layers.

Mr. Wells cultivates two farms of about 300 acres each, 70 acres of the 600 being upland pasture. The Home Farm of 332 acres is worked on the four-course system. Steam-cultivation is extensively practised; Mr. Crosbie, Mr. Wells's manager, asserting that the cost of cultivation is only 4*s.* per acre, while he considers the work both more cheaply and infinitely better done than that effected by the use of horses. At Michaelmas, 1866, the second farm was taken in hand, of which not more than a sixth part will at present admit of steam-cultivation, the rest of the land being full of large

* A medium dressing of from 3½ to 4 inches deep is generally considered sufficient.

trees of from 10 to 40 feet in length and from 6 to 18 inches in circumference, the remains of a submerged forest. Many of the trees are in a good state of preservation: the largest specimens being principally oak, the smaller kinds red willow and other varieties. The removal of these trees costs a considerable sum per acre. The plan Mr. Wells adopts, the first time of cultivating, is to plough each field deeply by horse-power, so as to find as many trees as possible, and remove them, in order that steam-cultivation may be used for all subsequent operations, even to drilling and harrowing in the seed corn. The necessary implements for these operations are now in course of construction.

It must here be observed, however, that deep ploughing is objectionable on the clayed land until after, in the course of three or four years, the clay has become thoroughly incorporated with the soil, and under these circumstances recourse is had to the cultivator, which can be worked at the season most suitable to produce required results, and with marked benefit to the ultimate crop.

Mr. Wells has erected commodious and excellent homesteads on some of the newly reclaimed farms, but their construction was attended with great cost, as all the buildings had to be supported on piles; and even this has not proved satisfactory, for although the highest ground has been invariably selected for the sites, yet owing to the general subsidence of the surrounding district the water level has been in several cases reduced below that of the foundations, and where this has occurred the heads of the piles have decayed, causing the buildings to diverge from the perpendicular, and rendering it necessary, in some instances, to renew the piles at a great outlay. On the estate are also some very neat labourers' cottages, constructed of wood, the walls being formed of feather-edged boards nailed to strong posts, and well plastered and finished inside, while the roofs are carefully and substantially tiled. They are pronounced by the inmates to be most comfortable.

A dim idea may be formed of the nature of the soil and the difficulties to be encountered in conducting improvements, from the fact that during the period of nineteen years the land has subsided 7 feet 3 inches.

Many of the fen-land farmers are now turning their attention to the wintering of sheep in yards. In the early season of 1867 many farmers, owing to the difficulty and risk attendant on the purchasing of beasts, confined themselves entirely to sheep. Those who have had the greatest experience speak favourably of the results; saying that the manure is better than that made by cattle, and the sheep thrive much better than when kept on the

land. A few sheep have suffered from lameness; but losses from this cause are not uncommon in the district when sheep are kept on the land. Shearlings in general winter better than lamb-hoggs: they are fed on mangold, kohl-rabi, and turnips, with plenty of clover-chaff and two or three fodderings of straw daily; they pick the straw over when it is used for litter.

Mr. Thomas George, of Bythorne, whose death has been announced since this essay was written, was the most extensive tenant farmer in the county; his occupation embracing an area of 1600 acres, and its cultivation employing a team of from 55 to 60 horses. The land, although belonging to various owners, is not detached, but lies well together. At Bythorne village, where Mr. George resided, the owners being the governors of St. Katherine's Hospital, London, the farm buildings, only recently erected, are extensive, well arranged, and most substantial in character; the yards are dished out in the centre to the depth of five feet, and all the buildings are provided with spouts for carrying off the water. On the occasion of the writer's visit the yards were full of store stock of different ages eating straw, turnips, and from 4 to 5 lbs. per head per diem of good linseed cake. A large number of pigs are also kept; hence the manure is of excellent quality. The drainage of several fields is collected in a reservoir above the yards, thus giving an unfailing supply of water, and at the same time saving the labour and expense of pumping.

A large number of young stock are reared on the farm, several well-bred bulls being kept and used not only for heifers reared on the farm but for purchased cows. Many of the latter annually pass to supply the London milkmen, but always with the understanding that the calves shall be returned as soon as dropped. By this means a superior breed is maintained. The steers are all disposed of when from 3½ to 4 years old; the calves are kept progressing, but not put to grass till they have attained the age of from nine to twelve months.

Although the landlords erected the farm buildings, the tenant has been at great cost in levelling and road-making. On this farm some very comfortable cottages have been recently erected.

Mr. George also held a farm of 700 acres under the Duke of Manchester on a 25 years' lease. A great portion of the land was originally in old grass, which in its natural condition was of very little value; 500 acres, however, laid out in four fields, are now in cultivation, and the whole having been drained at a depth of from 3 to 4 feet, is sound enough to allow of sheep being folded on the roots during the whole of the winter months. On the farm are a comfortable farm-house and a compact and substantial farm-yard, with suitable buildings, all of recent

erection. The bringing this farm to its present state must have been an expensive undertaking; the cost of drainage, paring, road-making, grubbing, &c., having amounted to at least half the value of the fee simple of the land in its natural state, while in its present condition it gives satisfactory evidence of the results of labour successfully applied, and capital judiciously expended. Mr. George preferred the plan of hiring steam-engines and machinery for thrashing, chaff-cutting, &c., to that of purchasing them himself. With fields 120 acres in extent, it might be supposed that a more suitable place for the steam plough to work could not easily be found; but even if steam were used, a large number of horses must necessarily be kept, as the soapy nature of the land renders it necessary to take every advantage of weather, and to employ all available strength to get the manure on the land at the proper time. Considerable quantities of artificial manures are used for the turnip crops. Where the land will bear eating off, about one third to one fourth of the roots are carted home and consumed by the stock in the yards, the remainder being fed on the land, on the 1600 acres. A breeding flock of about 1200 well-bred Lincoln ewes is kept. After a sufficient number of theaves have been selected to keep up the flock, the produce, together with 200 or 300 bought hoggs and the draft ewes are sold off to the butcher. A very large number of pigs are also fed, and when fat are sold to the Leicester and Birmingham butchers; they are all weighed alive before leaving the farmyard, and a certain allowance is made, which pretty closely adjusts the charge to the butcher's weight.

An occupation of such magnitude requires much care to direct and control the necessary operations; but Mr. George, who was a calculating and thoroughly practical man, was quite up to the work, and although well supported by efficient bailiffs, they severally took their instructions from himself. This occupation is a good illustration of what capital and skill are capable of performing on the waste lands of not only this, but many other counties; indeed, the land, although only of average quality compared with much that is still in a state of nature, produces in its now improved state as much or more stock food than it did when in grass, in addition to at least 3 quarters of corn per acre annually:—a matter of no small importance to this country. The writer has no hesitation in predicting that at the end of twenty years the land will be worth double what it was in its original condition.

Mr. William Sisman occupies the Buckden Lodge Farm, 549 acres in extent, of which 130 are in grass. Mr. Sisman is a breeder of pure Shorthorns, and a successful exhibitor at many of the local shows. He also admires a good hunter, and has taken many

prizes with this class of stock. The number of cattle usually kept by him is seventy, with a flock of 200 breeding ewes. No store stock of any kind, with the exception of bulls, is ever sold, everything being made off for the butcher. Mr. Sisman holds under a 21 years' lease, commencing at Michaelmas, 1865. The farm has been entirely drained at the expense of the landlord, the tenant paying 4 per cent. on the outlay. The land here approaches nearer to the alluvium; it is less adhesive; superior in quality to that in other parts; and for the cultivation of the 419 acres not in grass a team of 16 horses is required. The farm is well managed, and good crops are produced. A portion of the root crops, with the addition of artificial food and cut chaff, is consumed on the land by sheep.

Mr. A. Findlay's farm adjoins the foregoing, to which it is similar in quality; it is well drained, and the whole of the old lands are thrown down level, a practice which seems to answer here, for the land is in a high state of cultivation, although practical men are agreed that on strong lands the levelling process should be effected by slow degrees, even where the land is thoroughly drained, otherwise the crops are perceptibly affected.

From Elton on the north-east, proceeding in a northerly direction, we pass through the parishes of Elton, Chesterton, Orton, and Fletton. The soil of this district is of a less retentive character than that of other parts, as it is near the escarpment of the oolitic rocks, and in some places trenches on the gravels of the Nene valley. On the gravels are grown good crops of roots, which are mostly eaten on the land by sheep. Here heavy crops of malting-barley are produced; the land being mostly cultivated on the four-course system. A good portion of stronger land which has been drained is in permanent pasture, and the grass lands of this district generally are managed in a very creditable manner. The strong arable land is mostly worked on the four-course rotation of three crops and a fallow; but where the land is thoroughly drained the six-course is followed. This land is capable of growing heavy crops of roots, but they are uncertain, and the injury often sustained by the land by their being fed off counterbalances the advantages derived from their cultivation. Where thorough drainage is effected, first-rate cereal crops, both as to quality and yield, are produced. In many places the inefficiency of the Government drainage is complained of, the allegation being that on the retentive soils the drains are put in too deep to take off the surface or rain water: but the error more probably consists in the drains being too wide apart.

From Yaxley on the north, and extending round the inland boundary of the fens as far as St. Ives on the east, is a belt of upland, of superior quality. This we imagine is due to the fact

that as the fens become relieved of their stagnant water, and the surface of the soil is reduced to a lower level, the drainage is gradually assisted. Here the land is more productive and is generally laid out in large fields, surrounded by well-kept hedges, with sufficient trees to give to the landscape a pleasant appearance, without being injurious to the interests of the husbandman. The grass land, though in general of second-rate quality only, is rapidly becoming improved in value, and the benefit to be derived from a thorough system of drainage is everywhere apparent; the improvement being still more striking where drained and undrained lands are brought in contrast side by side.

The same mode of farming is here practised as that mostly pursued on the strong lands of the county, viz., three-crops and a fallow.

II. The Oxford Clay District.

The second division comprises the Oxford clays, and extends from Diddington on the south, to Sawtry on the north, and from Pidley on the east, to Keyston on the west, embracing an area of about 120,000 acres in extent. The whole of this district is composed of a retentive clay, varying in adhesiveness as the oolitic rocks crop to the surface. The land, though not attaining to a high elevation, partakes of an undulating character which imparts a pleasant appearance to the landscape. The fields are generally large, with only a few stunted trees in the hedgerows; and the hedges, though bad in many places, are kept well cut. By far the greater part is under arable culture, and in general well farmed; in some places the grass lands have been drained, and where this has been thoroughly performed, and cake freely given for a series of years to the stock grazing on the land, a great improvement in value has been effected.

There are now few farms where summer grazing is not more or less practised. The system of breeding and weaning a certain number of calves each year is becoming general throughout the district; these at from two and a half to three years are either fattened off on grass or finished in the stalls; there are, however, still hundreds of acres of grass land in the county of very little value in procuring food for the million, unless the numerous colonies of ants which inhabit them be turned to good account by the game.

The only unenclosed land now left in the county is Gidding Field. This, however, it is believed will shortly be enclosed, as the necessary steps to accomplish it have already been taken. In this neighbourhood, and proceeding in a south-westerly direction through the parishes of Thurning, Winwick, Hammerton,

Catworth, and Old Weston, is a great deal of poor grass land. At Bythorne and Keyston, on the west, some superior farming prevails, and the land improves in quality with but little variation till it reaches the valley of the Nene, on the confines of the county. About Kimbolton and Wornditch is some very tenacious land. Kimbolton Castle, the seat of the Duke of Manchester, stands on the gravel of Ouse valley, which here runs in a south-westerly direction for about a mile and a half, having a width of a quarter of a mile, and being entirely surrounded by the Oxford clays. His Grace has upwards of 500 acres in hand, which he farms in a spirited manner. A good flock of Southdown sheep is kept, and steam-cultivation is extensively practised. From Kimbolton, taking a north-easterly direction, we pass through some poor grass land in the parishes of Long Stow and Easton to Ellington, where the soil improves in quality and productiveness; then, taking a north-westerly direction through Woolley, Barham, Leighton, Bromswold, and Buckworth, some fields of poor grass land are again met with. The whole of the arable land is here well cultivated. Both at Leighton and Buckworth sheep may be seen eating off kohl-rabi on the arable land; the mangolds are stored in heaps on the land where they grow, the heaps by their size and number giving proof of a fair crop. In both parishes there is a considerable extent of well-managed grass land of superior quality. On the south at Yelling is some inferior land; but on the confines of the county, at Wood Hurst and Warboys on the east, good farming prevails; indeed it may be said, without fear of contradiction, that, as managers of strong land, the farmers of Huntingdonshire will bear favourable comparison with any in the United Kingdom.

The great stain on the farming of the county is the large extent of poor, undrained, unproductive grass land, which yet remains unimproved. As an instance amongst many of what may be effected, an extensive agent and valuer told the writer that a few years ago he valued a parish in this county, where a small proprietor had some time previously purchased 120 acres of banky grass land for 20*l.* per acre; of this land he thoroughly drained and broke up 60 acres, and the first three crops made 40*l.* per acre, or twice the fee simple of the land: the remaining 60 acres were allowed to continue in their natural state and were used as a sheepwalk, and these the valuer put at 14*s.* per acre, while he valued the other portion at 24*s.*

The improved state of the strong lands of this county has principally been brought about by drainage; indeed, on many farms the produce has been doubled within a period of twenty years. The spirit of improvement is now abroad, and doubtless ere long a considerable increase will be gained. Indeed there is now little

arable land which has not been once drained; but in cases where the drains have been put in at a depth of from 24 to 30 inches only, a greater depth being found necessary, much of the work has had to be gone over a second time, and the drains put in at a depth of from 3 to 4 feet. Drainage has likewise had the effect of not only producing a better quality of grain, but causing it to ripen both earlier and more evenly. I had shown to me a sample of barley grown near Kimbolton, on some of the most tenacious land in the county, but now perfectly drained, which bore the appearance of having been the produce of some of the best barley soils of the county of Nottingham. The district under consideration produces on an average of years about four quarters per acre of wheat, five quarters of barley, and four quarters of beans, the rent varying from 18*s.* to 27*s.* per acre.

The new Union assessment has in some districts nearly doubled the rates; in a few years, when the roads have once been put in a thorough state of repair, there will doubtless be a reduction. Some parishes are at present paying three tenpenny rates.

Tenancy.—The land is mostly held on yearly tenancy; the time of entry being Michaelmas and Lady-day. On some estates the outgoing tenant is allowed on valuation for unexhausted manures; the system, however, is not general; hay and straw are valued to an incoming tenant at a consuming price; seed and labour, and the year's rates and taxes, being charged on the fallow wheats.

Cropping.—Different systems of cropping are adopted; but on the strong land a modification of the four-course most generally obtains. A portion of the first-year fallow being sown with winter tares, is fed off by sheep, or mown green for the farm-horses during the summer, and then properly cultivated; another part is sown with mangold, turnips, or kohl-rabi, which are generally partly eaten on the land, and partly on the grass-land or by sheep in the yards; the remainder is treated as bare fallow, or sown late with rape or mustard.

Second year.—Barley drilled at the rate of three bushels per acre. As the use of the cultivator is preferred to that of the plough, spring ploughing is avoided as much as possible before the seed is deposited.

Third year.—Beans succeed the barley where tares were grown upon the fallows; the other portion being sown with clovers, so that each crop comes alternately but once in eight years. On all the stiffer kinds of soils broad clover alone is grown, whilst, on freer soils, a mixture of trefoil and Italian rye-grass is most in favour. The broad clovers are all put in with the drill, the rows being from three to four inches apart. By the adoption of this plan they are found to stand much better.

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Fourth year.—Wheat is sown after both beans and clover; the clover-brush, whether grazed or mown, is usually broken up after Midsummer, and worked as a fallow. The seed, at the rate of $2\frac{1}{2}$ bushels per acre, is always if possible put in with the drill; a good part, however, of the crop of 1867 was sown broadcast, in consequence of the wetness of the season.

Where the land is well drained the six-course is often advantageously adopted. 1st, fallow; 2nd, barley; 3rd, seeds, mown or grazed; 4th, wheat; 5th, beans, manured; 6th, wheat. With a liberal application of purchased manure an increased produce may thus be reaped, whilst the land need suffer no damage, if the soil be of the best kind, and the management good.

Draining.—Practical men are agreed that drainage has done more than anything else to improve the farming of the county. The depth of the drains and their distance apart vary according to the necessities of the soil; but there is a growing desire amongst the more intelligent class of farmers to go deeper than formerly. Amongst others, however, the Government drains are always thrown in the teeth of those who advise deep drainage, although, as already stated, the Government system failed less from the drains being too deep than from their being too far apart; it is nevertheless surprising how some of this land retains the water, even when in close proximity to the drain.

The writer walked over a remarkably tenacious field belonging to Mr. Chapman, of Wornditch, which had been drained $3\frac{1}{2}$ feet deep, and 16 feet apart. Mr. Chapman being dissatisfied with the result, had the drains opened, and, to the depth of about one foot, straight thorns placed on the top of the pipes, after which the soil was again filled in. The field has now a very good plant of broad clover upon it, and when I walked over it on the 30th of January, 1867, though shortly after a heavy fall of rain, it was very sound, having no water standing anywhere in the furrows.

On some estates the drainage is done at the joint cost of landlord and tenant, the landlord finding pipes, and the tenant putting them in; on others, again, the work is done at the sole cost of the landlord, the tenant paying interest on the money expended. This plan we consider most satisfactory both for the owner and occupier, particularly where the land is held on yearly tenancy. On large estates, where there is a staff of properly-qualified men, the work is invariably better performed than when done by the ordinary labourers on the farm; the county, however, is noted for its drainers. A few years ago the writer had the honour of officiating as judge at a county draining match, at which there were upwards of forty competitors, more than half of whom did not break the ground above eight inches wide, and several only seven inches, to go to a depth of four feet. One side

of the drain is cut perpendicularly from the surface to the bottom, while the other gradually slopes from the top to the width of the pipe at the bottom, each side being as smooth as if cut with a plane. The price for four-feet drains is from 2*s*. to 2*s*. 4*d*. per chain of 22 yards.

Stock.—The stock of the district has been not less improved than the cultivation of the soil.

Horses.—A good many horses are bred: the small farmers confining themselves principally to cart-horses, which they break in to team-work, selling the best of them to the London dealers at five years old. The large farmers aim more at breeding good weight-carrying hunters; on most large farms a good half-bred brood-mare may be found.

Cattle.—The cattle are mostly of the Shorthorn breed; the system of weaning is becoming more general, and there are now few farms where breeding is not practised. Some few cattle are sold as stores, but the greater part are made off fat from the field or the fold-yard, at from 2½ to 3 years old; the heifers being mostly sold down calving at the same age.

Sheep.—The breed of sheep most common is the improved Lincoln, of which many good flocks have been in the county for several years. Rams have been purchased or hired at Peterborough fairs from the flocks of Messrs. Kirkham, Casswell, Williams, and other equally celebrated breeders, and their use has produced the most satisfactory results. On some farms the lambs are sold off at weaning time; they are now, however, more generally kept on the grass-land through the winter, and occasionally in the yard in bad weather they receive a small allowance of mangold or kohl-rabi, with a liberal allowance of cake, after which they are sold off to the butcher during the summer. On some of the worst land, where only a few ewes are kept in the winter, store tegs are purchased in April or May, grazed through the summer, and sold about November, to be fattened on turnips in Bedfordshire or Northamptonshire. About a month before the lambing season begins the ewes are generally kept in yards at night, and have a small allowance of corn, and plenty of cut chaff. They run on the pastures during the day, where they have a few mangolds thrown about for them.

Pigs.—The rearing and feeding of pigs is carried on to a considerable extent. The Berkshires are the best adapted for bacon; the Suffolks and Neapolitans for pork; the smaller variety producing a finer quality of meat. Those intended for bacon are generally kept in the yards in summer, and fed on beans, wash, and offal: after having gleaned the stubbles they are put up and fed on barley-meal, Indian corn, and miller's offals. From eleven to sixteen score are the general weights they are fed to.

Manures.—The farmyard is the principal source from whence manure is derived; and such manure when well made is by far the most valuable fertiliser that can be applied to strong land. That, in this respect, there is an improvement on the practice of former times is obvious, yet there is still ample room for increased exertion. As the land becomes more freed from water, and the cultivation of root-crops extends, the manure of the farm will doubtless become better; but at present oil-cakes of different kinds are largely used with straw during winter. Some difference of opinion prevails amongst practical men as to the most suitable state in which to apply farmyard manure. We are of opinion that when put on the land direct from the yard in an unfermented state the greatest benefit is insured at the least waste of manurial ingredients.

Implements.—Improved iron ploughs have almost invariably superseded the old clumsy wooden implement, and iron harrows are likewise becoming general. One-horse carts are in use on some farms, but there is a singular clinging to the old, heavy, broad-wheeled cart and the wooden-armed waggons of a century ago. Chaff-cutters worked by horse-power are to be found on most farms. Thrashing is done by portable steam-engines and machines hired for the purpose. Few reaping-machines are found on the clay-lands; the sticky nature of the soil, particularly in showery weather, precluding their profitable use. Coleman's cultivators are used in the summer on the fallow lands; and Suffolk corn-drills are almost universal, the light steerage-drills being of little use on the clays, particularly for putting in the wheat-crop.

Harvesting Corn.—The scythe has entirely superseded the sickle and the reaping-hook; the cutting of corn is now invariably performed by task at so much per acre, and the carting is done by the day. The advantages of tying up all the different crops is generally admitted, and little corn is saved in a loose state. The prices paid for mowing and tying are from 6*s.* 6*d.* to 9*s.* per acre; the rate of wages per day for carrying being 3*s.* 6*d.* to 4*s.*, with an allowance of beer. Some farmers, instead of beer, give their men 20*s.* for the harvest, which is not only better for the men, but saves a great deal of trouble to the farmer. Thatching is commonly done by piece-work, and costs from 10*d.* to 1*s.* 2*d.* per square.

Labourers' Wages.—The regular men employed on the farm are paid weekly, generally on Friday evening. Common labourers get 11*s.* to 12*s.* per week; shepherds and horsekeepers, in addition to a house and garden found rent free, receive from 12*s.* to 13*s.*

Labourers' Cottages.—The agricultural labourers are generally congregated together in the small villages and hamlets by which

this part of the country is dotted. It is true there are some exceptions, yet I am grieved to say the majority of the cottages are of the most miserable description, many of their walls being only mud and plaster, with dirt floors, and without sufficient sleeping-room for the separation of the different sexes or the maintenance of common decency. Happily Boards of Health are taking up the question of cottage-improvement; for great as have been the efforts made to educate the agricultural labourer, the dwellings must be improved before a high standard of morals can be expected among their occupants.

Farm Buildings.—These are mostly of an inferior kind, and on many farms quite inadequate to the requirements of modern times; many of the outbuildings being merely erections of clay and stubble, and serving only as a temporary shelter for the stock. It is not unusual to find a barn and cart-horse stable of a tolerably substantial kind; but the rest seem improvised to meet the requirements of the moment, and to be increased in extent from time to time, as improved cultivation proceeds. The farmhouses also call loudly for improvement: quite a revolution in society has taken place within the last quarter of a century, and why should the farmer be compelled to lag behind? Should he not occupy the same social position as the tradesman or manufacturer with an equal amount of capital embarked in his business? This is a landlord's question, and should have his serious consideration, since it is found that farms with good houses upon them are much more inquired after than where the reverse is the case, and that, too, by a superior class of tenants.

Mr. John Chapman, of Wornditch, near Kimbolton, who has died since the following paragraph was written, occupied about 1300 acres; 900 acres being his own property, and 400 rented of the Duke of Manchester. The occupation is about equally divided between grass and tillage. The farm is worked on the four-course, and as Mr. Chapman was an extensive grazier, he produced as much green crop as possible: viz., tares, mangold, kohl-rabi, and common turnips. Thorough drainage and the liberal use of cake on the grass land for a great number of years have produced pastures of good quality, and at the present time 160 to 180 beasts are turned out fat each year, part being sold from grass land, and the others finished off with cake and roots in the stalls. Mr. Chapman preferred a good Shorthorn to animals of any other breed. Many of his beasts at Christmas, 1867, made from 30*l.* to 40*l.* each; and when the writer visited his farm at the end of January, there were still some beasts worth from 34*l.* to 36*l.* each left in the stalls. On the farm about 1300 sheep of the improved Lincoln type are kept. For some years rams have been used from the flock

of Mr. J. H. Casswell, of Laughton. No store-sheep are ever sold off this farm, but everything is made fit for the butcher. Last year large quantities of roots were purchased in the fen districts, and, besides their price on the spot, entailed an expense for carriage of six or eight miles by land and thirty miles by rail. About a month before the lambing season commences the ewes begin to have an allowance of cake and chaff; the lambs are supplied with cake as soon as weaned and are so kept until they are sold to the butcher. This system of high keeping tells favourably on both the fleece and the carcass, and continues steadily to improve the quality and capabilities of the soil.

III. The Gravels of the Ouse Valley.

The third district comprises the gravels of the Ouse valley, and covers an area of about 50,000 acres. Proceeding from Huntingdon in an easterly direction, and embracing part of the parishes of Hartford, Myton, Hemmingford Abbots, Hemmingford Greys, St. Ives, Needingworth, and Holywell—then southward through Brampton, part of Buckam, Offord Cluny, Offord D'Arcy, Diddington, Paxton, and St. Neot's, from Brampton, interspersed with patches of fen-land—it divides into two narrow branches, one of which extends to Spaldwick on the west, and the other to Alconbury Weston on the north-west. On the banks of the Ouse is a considerable extent of very productive meadow land; the upland, under arable culture, being worked on the four-course rotation of wheat, roots, barley, and clover, or mixed seeds. The best farmers draw off one-third of the swede crop to be consumed in the yards by feeding cattle. A great many sheep are bred and fed in this district; large quantities of cake being used. The frequent repetition of clover on the land and the high system of farming increase the uncertainty of the crop. When the plant fails a crop of peas is generally taken; but in such cases the succeeding wheat-crop suffers in productiveness.

Mr. John Jenkins, landlord of the George Hotel, Huntingdon, occupies upwards of 600 acres of land in this neighbourhood, part of which is on the gravel and part on the Oxford clay. The light land is worked on the four-course: the strong land is, 1st, wheat; 2nd, fallow; a large proportion of which is sown with tares, part being fed off the land by sheep, and the other part cut and consumed by beasts and horses in the yards, a crop of common turnips being afterwards taken and consumed on the land by sheep. During the early part of the season the land is ploughed up, and being acted on by the winter and spring frosts, a turn or two of the cultivator produces a good tilth for the succeeding barley-crop. 3rd crop, barley, seeded down generally with broad clover, which

is commonly drilled in at the rate of from 16 to 20 lbs. per acre; the clover is either mown or fed off by sheep. On some of the strong lands round Huntingdon the practice obtains of growing mangold on the same land for a succession of years; large quantities of farmyard and other manure being used. By adopting this plan the chances of obtaining a good crop are reduced almost to a certainty.

Market-gardening is extensively practised on the gravels from Hemmingford and St. Neot's, to the confines of the county at Eaton Socon; the produce being sent to London, and manure brought in return by the Great Northern Railway. This land lets in small lots for the cultivation of garden produce, at from 3*l.* to 5*l.* per acre. At St. Neot's a new corn exchange has recently been erected at a cost of 4000*l.*

St. Ives, on the east, is noted for its stock market, which takes place every Monday, and, before the outbreak of the cattle-plague, was one of the largest in the kingdom; the charter having been obtained from Edward I. about 1290. There are likewise two large fairs held on Whit Monday and the 11th October every year; the former having been established about the year 1110, by a charter granted by Henry I. Both here and at Huntingdon are extensive steam flour-mills, the property of Mr. Potton Brown; they are fitted up with all the newest kinds of labour-saving machinery, and a railway-siding runs up to the mill door, where the trucks are unloaded of the raw material and reloaded again with the finished article. Some idea may be formed of the magnitude of these manufactories when it is stated that at the two steam-mills and a small water-mill, belonging to the same proprietor, forty-two pairs of stones are kept at work. Mr. Brown likewise owns and occupies a large farm near Huntingdon, which he manages in a spirited and superior manner. Round Godmanchester is a considerable extent of very productive meadow land, nearly the whole of the hay grown here being sold off to supply the livery-stables of Cambridge and the racing-establishments of Newmarket.

About three miles and a half to the east of Huntingdon is Myton, a small parish of 1360 acres in extent, the soil principally clay, but of superior quality, and not altogether so tenacious as that elsewhere found. Mr. W. Looker, who lives in the old Manor-house, occupies upwards of 1000 acres, 200 of which are in permanent pasture. The whole of this occupation has been thoroughly drained at a depth of from 3 to 4 feet: of this a portion has been done at the joint expense of landlord and tenant, the former finding pipes and the latter the requisite labour; whilst the rest has been accomplished by capital borrowed from a Loan Company, the tenant paying interest for a certain number of years.

Mr. Looker farms on the four-course shift; one quarter fallow, one quarter barley, one-eighth beans or peas, one-eighth clover, and one quarter wheat. A portion of the wheat-breaks is seeded with Italian ryegrass and grazed until the latter end of May, when it is broken up to fallow, and after being exposed to the influence of the summer sun and winter frost, it is sown with barley early in the following spring. A large number of sheep, as well as cattle, are bred and fed on this farm; 100 tons of best linseed-cake being consumed every year; but scarcely any stock is bought, and nothing is ever sold except to the butcher. A large quantity of corn, in addition to cake, is consumed, mostly for pig-feeding, which is here extensively practised for the Birmingham markets: from 1200*l.* to 1500*l.* worth of improved Berkshire pigs being annually bred on the farm and sold off. The tenant, a thoroughly practical man, says that the sheep, which are of the improved Lincoln breed, have greatly improved in character and nearly doubled in numbers within the last ten years. The land is held on yearly tenancy, and any undue advantage being taken of the system is seldom or ever heard of.

Steam-cultivation.—There are upwards of twenty sets of steam-cultivating tackle in the county, but as the Society's Commissioners have already visited the principal steam-cultivated farms, and their report is before the public, any details are here unnecessary; suffice it to say that the wheat everywhere on the steam-cultivated land looks well.

Woods.—The woods in the county are of considerable extent; the timber consisting principally of oak and elm, and the underwood of hazel, ash, and willow. Little attention, however, is paid to their profitable cultivation. The underwood is periodically cut at from fourteen to sixteen years' growth. The price varies; where the timber-trees are numerous the underwood is less valuable. The writer saw some on the Duke of Manchester's estate, at Kimbolton, which had realised 14*l.* per acre; the average price, however, is from 6*l.* to 9*l.* per acre. The timber is generally thinned at the same time that the underwood is cut. There is a good demand for sound trees; but the great difficulty to be encountered generally in dragging timber to the river or railway considerably detracts from its value. There are a few ash spinnies which, at twenty years' growth, make from 25*l.* to 30*l.* per acre, the produce being used for hop-poles or converted into hurdles. In the valley of the Ouse are many well managed osier-beds, producing a rent of from 5*l.* to 8*l.* per acre.

Size of Farms.—Farms vary from 200 to 500 acres in extent; from 200 to 300 being the most common. The principal landowners are the Dukes of Manchester and Buccleuch; the Earls of Sandwich, Carrisford, and Harrington; Marquis of Huntly;

and Lords Chesham, St. John, and Overstone. Mr. Heathcote, Mr. Wells, Mr. Fellows, Rev. J. Linton, Captain Daberty, and some of the Cambridge Colleges, are all considerable owners.

Improvements.—No county in England, probably, has been more improved during the past fifteen years than the one under consideration. In many parishes the produce of both corn and wheat has been doubled; drainage, and the introduction of artificial feeding stuffs, have produced a revolution in the farming, which a few years ago the most sanguine never dreamed of; and it is only fair to the tenant-farmers to state that they have not failed to assist the landlords by freely contributing to the cost of improvements. Drainage operations are still being conducted with undiminished vigour. The quantity of oil-cake consumed by stock is greatly on the increase, and more of the produce of the farm is being converted into beef, mutton, or pork.

The manure is increased in quantity and improved in quality, and its favourable effects are already apparent on the crops.

Improvements still required.—In treating on this subject we feel as if treading on dangerous ground; so much easier is it to find fault with the doings of others than to rectify existing evils. The farm-buildings and labourers' cottages require serious consideration; as improvement progresses the wants of farmers increase; when only little stock was kept, few buildings were necessary; now, as the stock increases, the great want is that of sufficient shelter and accommodation; and in order to attract tenants of capital, intelligence, and skill, comfortable farm-houses must be erected for their homes. The agricultural labourer requires a different domicile to the one he now occupies, in order that he may be enabled to bring up his family in decency, and start them out into the world respectable in appearance and uncorrupted in morals.

A considerable extent of poor grass-land still requires improvement by drainage and other means, and a greater degree of attention might be advantageously bestowed on the woods. The waste is frightful.

Note of the Geology of Huntingdonshire.

Huntingdonshire belongs to what is called geologically the Oolitic system. It displays the characteristics of that range of rock formation in its soil and physical appearance. The south-eastern part of the county shows the iron-sand rising into rounded shoulders of hills; the larger part of the county, however, displays the Oxford Clay, which lies between the Middle and Lower Oolite. The depth of the formation varies, but is

generally about 700 feet. The hills on the confines of Northamptonshire and Huntingdonshire are of the forest-marble of the Lower Oolite, and overhang the Nene. There is a strip of green-sand—the lower formation of the chalk—on the south-eastern border. The stratification, thus pretty clearly defined, ranges between the new red sandstone and chalk.

The Oolite is interesting in many respects. With this system we pass from the fossils, whose forms and organisation bear little relation to any which now crowd the earth, either vegetable or animal. We pass, from what are called Palaeozoic forms, into the stratifications where we can trace distinct approaches to the vegetation and the animals of our own era. A new cycle of being, in fact, meets us.

The Oolite has been better examined in England than in any other country. Its Wealden, Oolite, and Lias groups, have occupied the attention of our most eminent geologists, and yielded rich results. The Oolite proper, indicated by its rounded grains, resembling the roe of a fish, is an aggregate of rocks and clays, and shelly or "brashy" sandstones. It is a marine deposit, having been laid down in generally tranquil waters. It contains grits, ragstones, and shelly bed, which, being exposed to the atmosphere, crumble and form a sandy soil, called by the farmer Cornbrash. The fossil-remains are very varied: remains of palms, tree-ferns, cycas nearly approaching our existing cycas, and zamia, indicating that though the great deposit was marine, yet the vegetation of the solid land was abundant. The animal remains give us representatives of almost every existing order.

The general appearance of an Oolitic district is pleasing; sometimes—as near and round Bath—displaying very charming scenery, both varied and picturesque. The Cotteswolds are well known for their beauty of rural landscape; but we do not find any high mountains in such a district.

The Oolitic system is important in an industrial point of view. Fine building stone, cement, and mortar, are got from it; beautiful marbles are quarried from it; also alum, fuller's-earth, ironstone, coal, and jet. In coal and ironstone the Oolite is very rich. The Lias-land of Yorkshire is especially noted for the latter. Northamptonshire also furnishes large quantities.

Huntingdonshire displays all the characteristics and yields most of the Oolite: generally it is fertile, and repays cultivation. Even its fen-lands when drained prove very rich. Its soil varies: patches of grome, sand, and clay, intermix with alluvial clay. Peat is found in some places, and used for fuel. Like some Oolitic districts, it is deficient in springs, but the Oolite generally being so little broken by upheaval or other causes, is

not notable for the number of its springs. The largest portion of the county being clay, though dense Oxford clay, renders lack of springs still more felt. Where the level is low the soil is damp, and large patches of water, like the "Meres" Ramsey and Ugg, give a peculiarity to the scenery. Aquatic wildfowl frequent them, and, with their peculiar noises, add to the wildness of the general effect. The county, however, is well drained.

Elvaston Hall, near Derby,
February, 1867.

XVII.—*History of the Rise and Progress of Hereford Cattle.* By H. H. Dixon.

Prize Essay.

"Herefordshire," according to old Fuller, "doth share as deep as any county in the alphabet of our English commodities, though exceeding in W, for Wood, Wheat, Wool, and Water." Its green orchard alleys made it a more favoured spot than Pomerania in his eyes. Its Golden Vale produced wool "known to the honour thereof as Le'mster ore," and so long and lustrous in its fibre that flockmasters were bidden not to envy the Tarentine and the Apulian. Its wheat was "worthy to jostle in pureness" with that of Heston in Middlesex, which furnished manchets for the kings of England, and its Wye salmon were "in season all the year long."

The quaint old commentator gleaned thus much two hundred years ago, in his circular rambles as chaplain to the Royalist army, and before his day "painful Master Camden" had described the county as "not willingly content to be accounted the second shire for matters of fruitfulness." Still both writers are silent respecting its cattle. The men were Worthies indeed, working to a wondrous old age in the fields, instead of being "the property of the chimney-corners," and ten of them, numbering more than a hundred years each, could be found to dance the Moorish before King James. Still the Whitefaces had no place in the cornucopia of W's, and there are no "vaccine verses" (as Southey styled John Hutchinson's) to atone under this head for the barrenness of prose. Drayton, who sang of "Fair Suffolk's Maids and Milk," the hogs of Hampshire, and the calves of Essex, and how

"Rich Buckingham doth bear
The name of 'Bread and Beef,'"

spake only in his "blazon of the shires" of Woof and Warp, as the attributes of Herefordshire. He does nothing towards con-

firming the belief that this county of the light red sandstone is the earliest home of the Middle-horn.

Some are of opinion that the cattle of the county were originally brown or reddish-brown, from Devon or Normandy, and that the appearance of a white-faced bull-calf at Huntington in the middle of the eighteenth century, was deemed akin to a prodigy by the Tully of that day. Allusions are also found in old chronicles to white cattle with red ears on the north side of the Wye, with which the Welsh princes were wont to compensate each other for injuries, or soothe an angry king. It is also on record that Lord Scudamore, who died in 1671, introduced red cows with white faces from Flanders, which may have cropped up in the Tully bull-calf; so that, after all, the theory of some of the Hereford breeders, that the pride of their pastures and their platters have as indefeasible a two hundred years' title to the soil as the "Duchess" tribe to Stanwick Park, or the Longhorns to Bosworth Field, may be correct in the main. Old cattle-books have it that one William Town sold "nine Hereford oxen for 52*l*" on August 25th, 1694; and then a veil, which no chronicler can lift, is drawn over their history till about 1766, when Messrs. Tomkins (who was also a great breeder of Ryeland sheep), Weyman, Yeomans, Hewer, and Tully, stood out from their fellows, as the special champions of a county breed.

The late Mr. John Monkhouse, of The Stow, was, at the time of his death, in the autumn of sixty-six, the oldest breeder-link with the past. Speaking to us of 1809 when he and his trusty cousin, Mr. Hutchinson, left Cumberland, to push their joint fortunes on a Radnorshire farm, he thus epitomised the Herefordshire breeders, who were then giants in the land:—"I found Ben Tomkins, Price of Ryall, and Smythies of the Lynch, the great mottle-face men; Tully and Knight had the best light greys; and Walker of Burton Court, Hewer, Yeomans, and Weyman, with his strong-boned tribes, were the most noted for the white-faces. We young fellows thought we should like to lay in a stock from Mr. Ben Tomkins, and so we drove over to see him. He asked us a hundred guineas—not pounds, mind you—for an in-calf heifer, to calve at Christmas, and that was all the satisfaction *we* had."

Mr. Eyton did not commence his Herd-Book until 1845, and then the jealousy as to cattle caste between the rival breeders of the white and the mottle-faces not only went far towards jeopardising its success, but almost strangled it in its birth. The mottle-faced party seem to have brought most influence to bear, and, as Mr. Duckham has pointed out, by leading off with "Leopold" (1), and throwing back "Aaron" (82), they disarranged the whole of the numbering. It was not, however, a

mere county strife of the white and mottled roses, as the dark and the light grey breeds possessed some very loyal adherents. All four had their claims allowed in the drawings on stone, and the mottle-faced "Wellington," which was sold for 283*l.* in 1816, the dark-grey "Victory," the white-faced "Cotmore" (376)—a first prize Royal Agricultural Society's bull at Oxford—and the light-grey "Brockswood," were the chosen portraits for the first volume. Mr. Eyton did not receive any very hearty support, and resigned his task after the second volume to Mr. W. Styles Powell, who died before he had completed the third, and Mr. Duckham, the present editor, entered upon his labours in 1857. A more able Registrar-General could not have been found. The sixth volume carries the bulls down to "Zouavite" (2905), and contains entries—of which Mr. Naylor furnished 57, and the late Mr. Rea of Monaughty, 60—from no less than 231 breeders. Among them are a few names from America, Canada, Germany, Australia, Ireland, and Jamaica; but, with the exception of one in Aberdeenshire, there are no breeders further north than Shropshire and Montgomeryshire.

The mottle-faces were generally supposed to be akin to the dark, and the white-faces to the light-grey; but the four varieties have pretty nearly merged into the red with white face, mane, and throat. In fact, it has been very reasonably argued from the circumstance of "a Hereford with a red ring round his eye" being specially alluded to in Mr. Brandreth Gibbs's 'History of the Smithfield Club,' as one of the Show beasts in 1812, that the Hereford of that day was chiefly connected in graziers' minds with a white face. Still Mr. Monkhouse's evidence, which virtually refers to the same period, does not favour the idea that such a complete fusion of the sorts had then taken place.

Those cousins-german, the mottle-faces and the dark-greys, had not many points of difference. In both of them small red spots were plentifully interspersed among the white; but in the former these spots were of a darker colour, and more on the face and feet, while the broad white stripe along the back was wanting. The horn of the dark-greys was shorter, and had more of the "Ayrshire cock," and no black tip. These dark-greys were also smaller in size than the mottle-faces, smoother in their coats—a point which Herefordshire breeders do not covet—and better both in their crops and their temper. The mottle-faces were popularly known as "Ben Tomkins' sort;" but although they made his fame at Wellington Court, he attributed much of his success to the use of "Silver" (41), a white-faced bull. The picture of that equally eminent breeder, the late Mr. Price of Ryall, which meets the eye in so many West-Midland homes, is as true an emblem of faith in the Hereford, as that of the late

Mr. Frank Quartly in the "red and all red" Devon, as you roam away to the west.

When the century was young, the Hereford breeders' pride was wont to develop itself in giving show-yard challenges. Mr. Meek, of Lichfield, was as unlucky in 1812, when he accepted the Ryall *defi* to show a score of Hereford cows against as many Long-horns, as he had been two years before, when he himself threw down a challenge to the same amount to show single bulls, and dare not meet Mr. Walker's "Crickneck" (175). Mr. Price did not shrink from giving the Short-horn men the same offer in 1839, with twenty cows and a bull, when Mr. Bates was flushed with his Oxford victories; but the Kirk-Levington philosopher did not come to terms, and the stipulated month passed over without any results. Mr. Ben Tomkins did not care to send cows from home on such a mission; but he offered to pitch "twenty for a hundred" against all comers at Hereford. The Rev. Mr. Smythies of The Lynch, "a singular grand divine" (so Cheviot shepherds phrase it) among Herefords, as the Rev. Henry Berry was among Short-horns, felt anxious to show five times as many of all ages for the same sum; and Mr. Weyman was ready to bring out his white-faced bull "Stockton" (237) against all England for five times as much. Such praiseworthy pugnacity met with no response, and the breeders had to content themselves with a more solid proof of excellence, in the prices made by the herd of Mr. Ben Tomkins after his death in 1819. Twenty-eight breeding animals averaged 152*l.*, and Lord Talbot, who always stood very stoutly by the sort, gave 262*l.* 15*s.* for a cow, and considerably more for a bull.

Long before this, Mr. Westcar, of Creslow, had set the hall-mark upon the Hereford bullocks. He is said to have first appeared at the Hereford October Fair in 1779, and it was with beasts purchased there for forty years in succession that he won so many first prizes from the very commencement of the Smithfield Club Show in 1799, when cattle of all breeds came into competition, and were merely classed as light, middle, and heavy weights. He principally owed his success to the light or Tully greys, and one of his most celebrated six-year-old winners, whose dead weight was 268 stone of 8 lbs. was from this stock, and by a white-faced bull. It was some time before Mr. Tully felt quite reconciled to the fall of light-grey calves by this sire, but Mr. T. A. Knight of Downton Castle fancied them, and a tribe which Mr. Duckham has described as "smaller in size, more even and firmer in their flesh, and with an upward tendency of horn, showing that a commingling had taken place with the light and dark grey," became known as

the "Knight's Greys." Some of those exhibited from the Downton herd of late years have been perfectly white. Mr. Salwey, of Ashley Moor, was a great admirer of the light-greys, and it was with cows purchased at his sale in 1844 that Lord Berwick laid that foundation, on which he built so judiciously, with white-faced bulls from the herds of Messrs. Hewer, Carpenter, Longmore, and Williams. At his lordship's death, eighteen years later, there was only one light-grey "Lord Grey" in the herd, and Mr. Knight purchased him.

The love of good bullocks is an honest prejudice which cleaves to the heart of the county. Its beef raising system is its especial glory, and farm after farm has played its part well, not only on the "home-fields" of Hereford and Leominster, and under the Norman fortress of Ludlow, but in a wider sphere each December and July, or on the Smithfield stones. It would be invidious to speak of one county-man above another, but crossing over the boundary line near Moor Court, with its quaint gables and black Cheshire cross-gartering, and its recollections of "Cotmore" (376), who could pull down 35 cwt. on the scales, we enter Radnorshire, and reach Monaughty or the Monk's House. Here for nearly half a century, the late Mr. Thomas Rea followed up what the white "Snowball" had begun, with the choicest bred sires from "Crabstock" (303) to "Sir Benjamin" (1387), and "Grenadier" (961), and won fully two hundred prizes. The late Mr. Marsh of Elkstone also backed up the breed well outside the county limits; and "Battersea" (1865), and five Royal Society female firsts have graced at one and the same time the Luddington herd near Stratford-upon-Avon. "Claret" (1177), "Milton" (2114), and "Lady Ash" are still well remembered names round Golding Hall in Shropshire, although Mr. Hill has quitted it; and we find solid traces of "The Knight" (185), "Sir David" (349), and "Big Ben" (248), in the Vale country near Welshpool. "Wonder" (420), "Walford" (871), "Attingham" (911), "Albert Edward" (859), and "Severn" (1382), have all borne their part in the Attingham and Cronkhill pastures, which sent up in their day twenty-seven firsts and seconds to the Royal Agricultural lists. "Tom Thumb" (243), was a very favourite bull at Cronkhill, and his lordship was wont to quote him as an instance of the thriftiness of the sort:—"one which will get fat upon nettles." The "Silver" tribe, consisting of the old cow, whose origin was not very clearly known, six daughters and a calf, made 376*l.* 17*s.*, and one of them, the prize cow "Carlisle," by "Albert Edward" (859), passed into Mr. Duckham's hands, as a doubtful breeder, and became the dam of the double first "Commodore" (2472), by "Castor" (1900).

Herefords have been bred at Woburn Abbey as far back as 1790. Three first Smithfield Club prizes fell to their lot, and it was with three of the breed that John Duke of Bedford, in 1825, beat three of the Hon. Charles Arbuthnott's Short-horns in a sweepstakes. The Keightley, with its rather light flesh, white sides, and deeper milking powers was a very choice tribe, but it is the best of the Bright-eyes which is preserved with Mr. Hewer's bull "Favorite," in a pleasant pastoral picture, with a sheep and shepherd background, in the Abbey Collection. The breed has been well tested as milkers, but although we pressed him hard on the point, Ricketts, the old herdsman, could not speak to more than 16 quarts per day from any cow in the height of the grass, and even after a third calving. The chief difficulty with them at Woburn has been to make them milk, and latterly they have merely suckled their calves, while Suffolk-polls and Alderneys have been their dairy substitutes. As regards milk, "the Herefords generally dry themselves fast enough." Still, if in point of quantity they fall below many other pure breeds, the quality of their milk, like the Galloway's, is undeniable.

The Prince Consort's Flemish Farm (where the Herefords were first specially located in 1855) has held its own well, under Lieut.-General Lord Bridport's management, both with fat and store beasts at the Royal Agricultural and the two great Christmas Shows. The Royal Farm winnings with the breed in these three arenas, up to the end of 1867, amounted to 400*l.* for 29 prizes, a large proportion of which were firsts, exclusive of gold and silver medals. Among the latter, is the Birmingham Gold Medal of 1851, for the best bullock in the yard, which was bred by Mr. Stedman of Bedstone. "Brecon" (918), was the first Hereford bull that the Prince Consort ever purchased; and his son "Maximus" (1650),—who goes back through his dam "Superb" to Mr. Price of Ryall's breed, and through his sire to that distinguished winner, "High Sheriff" (356),—was the first to bring the Royal Agricultural Society's orange card to Windsor.

The rule as to not exhibiting any store stock not bred at the Flemish Farm, was broken for "Adela," a purchase at Lord Berwick's sale, when she came in "the holiday time of her beauty," as a yearling heifer to "Battersea." She and "Maximus" (1650), took a first there, when all Herefordshire with its fifty entries could boast of no more than two; and Shropshire, Dorsetshire, Gloucestershire, and Warwickshire divided the other four. Never did the supporters of the breed close their ranks so well; as the cow, two-year-old bull, yearling heifer, and heifer-calf classes were universally commended. Eight prize

takers out of the twenty-four were bred in or directly descended from the Cronkhill herd, and "Ada," "Adela," and "Adelina," were all of its Silver tribe. "Milton" (2114), the Gold Medal bull was one of the eight, through his grandsire "Attingham" (911), and "Matchless," which took the same honour among the females, was a model of symmetry and making up. The breeders of Herefords have always been keen showers. They began their Royal Agricultural career with only 24 entries at Oxford, but the numbers swelled to 97 at Battersea, and to 113 when the Society was last within hail of them at Worcester. No men have invested the cattle portion of their shows with more life and novelty; and the bull, cow, and offspring; the bull, with three of his calves; and the cow groups, one for every fifty acres of occupation, contrast pleasantly with the somewhat monotonous routine elsewhere.

The late Mr. Clark Hillyard, one of the oldest and most eminent graziers in the Midlands, considered that in 1842 the Hereford men were "breeding their beasts rather too fine, too narrow in the chine, and too thin through the heart." Emulation has been considerably quickened since then, not only by shows and the Herd-book, but by the steady demand for steers from other shires, which have "Joseph-like, a better coat than their own." Deep, close-grained flesh and firm handling have been consistently aimed at, and achieved in herds, as well as neat and nicely covered points. We need not go back to "Cotmore" (376) for heavy-fleshed bulls, if we wished to draw a sample. We may point to "Sir Benjamin" (1387), who weighed 24 cwt. and girthed 9 ft. 6in., before he was three years old; to his son "Plato (2160), whose back was like a table; to "Will-o'-the-Wisp (1454), whose twist seemed to fall below his hocks; to "Silvius" (1726), whose bosom almost touched the ground; and then to the gallant, fine-handling "Severn" (1382). As to thickness, Severn's great rival "Claret" (1171) was almost unequalled; and after his high pressure for shows, he was thought to be so useless, that, when he went as a forlorn hope to Shrawardine Castle, "those bet against him who had never bet before," and saw him at the end of two seasons the sire of nearly four score calves. "Sir Thomas" (2228) has also earned a name, not only as a prize-heifer getter, but as having brought back nearly 400 per cent. on his 100-guinea purchase of two years before, when he again came to the hammer at 6 years and 10 months. The females can also speak for themselves, through Mr. Perry's Worcester "Beauty" and the very different types of the massive "Bella" and the elegant "Spangle the Second."

The lower price of good Herefords as compared with Shorthorns, brings the best blood more within the tenant-farmers'

reach. They rely on their own, and not on the parish bull; and it cannot be said of them, as it has been with too much truth of others, that "a half-crown bull flourishes where a crown bull starves." Still carefully as the blood may be attended to at head-quarters, there is some truth in the remark that Herefords are not a very favourite sort with the London butchers. The fault is not with the beasts, but with this competitive age, which forces a man to "grind up his saplings." It would be strange if they or any other breed could bear a comparison with their forerunners of the more orthodox five-year-old beef era; and salesmen can say with justice that such noble bullocks as Westcar and Rowlands used to pitch in Smithfield Market are not seen at Islington now. White-faced cattle, like Black-faced sheep, are a breed which of all others require time to ripen; and that is just what their own thriftiness and modern usage combine to deny them. Hence they flourished best under the old school of graziers, who knew too well the roast-beef stomach they had to deal with to offer it young steers, and sometimes, when capital was plentiful, kept them even to six or seven years old. At present they are more profitable to the breeder and the grazier than they are to the butcher. In the grass-season, owing to their remarkable aptitude to grow fat quickly, they are sent off to market earlier than the others. Many of them are disposed to get very "creamy" in butcher's language, or to put on too much of their fat outside, and thus they do not "prove" as they ought. It is only with age that their meat attains its beautiful marbled appearance, or intermixture of fat and lean. The best come up from the Midland counties between July and December; a fair number are sent from Herefordshire, and none from Norfolk. An experienced feeder of both sorts writes us his opinion that "they will not graze to the size of the best Short-horns, but are quite their equals as feeders. They have generally," he adds, "a good chance, as the graziers can pick a more sorty lot out of them for his pet field, and therefore they often get the best of the grass." This testimony, as far as we can ascertain, is quite confirmed both by general observation and experience since Mr. Curwen's day.

A rough, curly coat is always preferred to a smooth one; it was possessed in perfection by Mr. Shirley's Gold Medal Smithfield Club ox of 1859, and has been a still greater point of ambition with breeders since. The dark-claret colour is more orthodox than the light or yellow red. "Claret" (1177) himself was a fine specimen of it, and his coat seemed almost black as he stood in the shade of his house. Sparkiness is not liked, but still it does not constitute a valid objection, or Mr. Naylor's "Variety" would not have followed up her Bingley Hall first at

Baker Street. Their fine, placid tempers are a very great point, as they not only feed better, but will bear packing closer in the strawyard, where the West Highlanders' horn is never in rest. This remark does not apply merely to bullocks, as we have seen at Cronkhill three 2-year-old bulls enjoying a happy fellowship in one box. In the yoke they combine the activity of the Devon and the strength of the Durham. They are very little used in their own county, but the Wiltshire men sometimes buy them at Hereford Fair, and, after ploughing with them for a year or two in teams of four or six on the downs, pass them on to the Bucks graziers. We have met with eight of them in the drag-harrows on a Sussex farm, whose tenant found them quite equal in powers of draught to the county reds, and answering with as much docility to the "Duke!" and "Diamond!" "Love!" and "Lovely!" —exhortations and mysterious pricks of the goad, with which the driver-boys guide their steps. Those who have tried all three sorts assure us that they have not the pace of the Devon, but that they go quite as fast as the Shorthorn. The late Mr. Forbes, of Echt in the north of Scotland, used them in teams of six to trench-ploughs, which turned up whin, heather, and stones to the depth of nearly 14 inches. Despite the immense strain upon them, they never broke step, whereas horses, if such a task had been set them, would most probably have snapped every trace. They are remarkably easy to break to the collar, but if there is a recusant among them, he is pretty certain to be a mottle-face.

The great majority of the calves are dropped in April, May, June, and July; but the breeders, where they are not tied down by the Royal Agricultural Show date of July 1st, prefer their cows calving before the hot weather sets in. Yearling heifers are very seldom put to the bull. Nearly all the calves are suckled for six months, and run with their dams, unless they come at the commencement of winter, and they are very rarely weaned on oilcake. The young steers are fed upon grass and get turnips and cut straw, and sometimes a little cake in the winter. No pastures send them along quicker than those by the Wye side. Ludlow, Leominster, and Hereford are the markets at which they principally come out in their third autumn; but many of the more forward lots have been sent off before the Hereford October Fair, and a great many never enter the fair at all, but are lifted at once from the pastures. Hence the general mass of buyers do not see the best of them, and remark, not without reason, on the falling off both in number and stamp from what they can remember. Leading buyers will not wait as they did when there were no railway facilities for travelling about to see and for removing the lots, and the *prestige* of a fair, be it

horse or cattle, is heavily discounted by so many previous bargains in private.

Hereford Great Fair takes place on the third Tuesday and Wednesday of October, simultaneously with the Herefordshire Cattle Show. "The red line tipped with white" begins nearly at the station, and extends right through the heart of the town as far as the "Cornewall Lewis" statue, and also branches off past the Cathedral. Eight thousand bullocks have been brigaded there, but since the new Cattle Market was opened, seven or eight years ago, the muster-roll has barely reached five. Carwardine the elder was once wont to fill Eign Street with his lot, and his son still comes with a goodly number, and supports the family name, as he marches up and down their ranks in his long coat and with his trusty ashen plant. The younger steers are generally offered at Leominster Fair on or about October 17th, and there in old times the Midland graziers would meet Carwardine, Pardington (who still pitches some large lots at Hereford), Knight, and Jones, to learn from them privately what lots they had, and to "take a feeler for the big day." Hereford seems fairly invested by "white-faces" for the time being; windows are barricaded against them, and trap-doors burst in by them; but still the inhabitants acquiesce gracefully, and feel thankful that such an invasion comes but once a year. Many of the first Midland and West-Midland graziers hail from this great Bullock 'Change each October, and chaffer with double zest for a lot, if it is headed by something that looks likely to "train on for Christmas year." "A real topper" has reached 50 guineas, if sold singly; and the late Mr. Monkhouse, who delighted to go through the market on "Sam's" arm, and to put his hand on all the prime beasts, more than once headed the quotations with a lot of his "Chieftain" (930) on "Madoc" (899) blood. The unsold lots are at their places again by dawn on the second day, and sometimes a show-beast bears them company, with his prize ribbons or his show-card for a token on his head. A large number are sent off by rail; but the high road to the Midland pastures by Worcester and Stratford-upon-Avon is still vocal for many days after with the drover's cry.

Mr. Pusey once quoted, to the amusement of a Royal Agricultural Society dinner audience, the dictum of a foreigner, that "the English grazier rides in his coach, clad in a velvet coat, and with chains of gold about him." The idea was a magnificent one, although it lost somewhat of its force from one of the reasons given for such affluence, "because they rear cattle with such big bone." Even Mr. Westcar, of Creslow, could not have realised it, although he averaged 106*l.* 6*s.* each (according to his

sale-book) for twenty of his Hereford prize oxen between 1799 and 1811. These bullocks passed their time, between Hereford October fair and the block, in Creslow Great Field, whose 323 acres 3 rods and 2 perches can carry 220 bullocks and 200 ewes with ease. No pastures develop beasts more quickly, and since Mr. Westcar's day, the "Great Field" has generally been stocked with Herefords. When Mr. C. S. Read, M.P., wrote his Prize Essay on Bucks Farming a few years ago, he found 90 Herefords among the 140 head at Fawley Court and Littimer in the same district. "Putlowes Beef" also owes much of its fame to them, and its "98 acres of rich deep loam on strong clay." The Lubbenham and Great Bowden clays carry them on well in Leicestershire, and Glooston feeds them as fast as the noted "One Hundred Acre" by the Welham side; but the Leicestershire men stock harder than they used to do, and send them off quicker and not so ripe in condition. 'The Gentleman's Magazine' does not tell us whether they were the chosen ones, when a party of Midland graziers met, and each determined to present his best ox to Sir Arthur Wellesley after the victory at Salamanca, but they and the white-faced runts now form the staple of the Midland beef supplies to Smithfield.

The admirers of rival breeds are very apt to exalt their horn at the expense of each other, and hence all comparisons must be received with caution. It is rare, indeed, to find a man of such strictly catholic mind, that either in judging or experimentalising he is not in some measure fettered by a foregone conclusion. However, there is no doubt that Herefords have given the other breeds many "a fair, flat fall" in the Smithfield Club lists. Still Creslow is a good deal nearer London than Durham, and the northern graziers would hardly relish all the risks of a walk to the coast as well as of shipment, and a long and perilous voyage in a sailing-vessel, for the chance of a small prize. "We can kill our own Christmas beef in Masham," was the proud reply of a Yorkshireman, when we once asked him in railroad days, if a very grand roan in a close was meant for London. Be this as it may, the Herefords took a long lead from the foundation of the Smithfield Club, and up to 1851 inclusive, (after which period the different breeds were shown in distinct classes) they had won 185 bullock prizes, or only five less than the Short-horns, and all the other breeds put together. The Short-horns made up their lee-way considerably in the females, and taking the breeds by themselves, during those fifty-three years, the Herefords are represented by 207 prize takers, and the Short-horns by 174. At Smithfield the Herefords put the finishing stroke to the old era in 1851, by winning the gold medals with Mr. Longmore's steer, and Mr. Druce's Short-horn

—Hereford heifer, and since then, with the new Scottish element of heavy "Short-horn crosses," and magnified West Highlanders to meet, they have twice taken the gold medal for bullocks, and thrice for females. At Bingley Hall during 1851-67, the gold medal for the best bullock in the yard has nine times fallen to their lot, and that for the best female seven times; while the "Ardington steer," the last that the late Mr. Philips ever "trained," took the "best beast" honours of the yard in 1864. The Berwick grey of Mr. Heath, who showed the best (Hereford) bullock in the yard, three years running in Birmingham, will long be remembered for its 9 feet 7 in. girth. It furnished one of the eleven first prizes which this eminent Norfolk feeder has taken at the Smithfield Club with steers of the Hereford breed, among which were the gold medallist of 1850, and the cup taker of 1863. One of his four seconds girthed 9 feet 2 inches, or 2 inches less than the cup steer; and his Hereford cow filled a 9 foot tape at 3 years 10 months. It has been said that "nothing but a baked apple ripens in England," but as regards early maturity, and ripeness of all the points, the cynic (if he had any eye for cattle) would have to make an exception in favour of Mr. Shirley's gold medal steer, the champion of the two leading Christmas shows of 1859. He was a fusion of white-face with mottle, so that both parties were fain to divide the crown. Although he girthed 8 feet 7 inches, he had not been "fed from the post." In fact, for seventeen out of his thirty-one months he had met with ordinary calf and stirk treatment, but never did steer answer more gallantly when his owner descried his promise, and "called upon him" with the oilcake.

The Hereford is very seldom crossed with the Short-horn, although we have seen the blood blend nicely enough when it has been pure on both sides. In Scotland, Mr. Lumsden, of Auchry (who once owned "Sir David" 349) is one of the few who has found it pay to put a Hereford bull on a cross-bred or pure Short-horn cow. One or two bulls have reached the Orkney Isles, but the sort has made no head in the great beef-producing counties of Banffshire, Morayshire, and Aberdeenshire, and it has no share in those "heavy Scotch crosses" which are poured into the metropolis by the steamers, as well as by the dead-meat and cattle-trains. Four score of Herefords were telegraphed for by an Aberdeenshire cattle-dealer nearly two years since, when the Ellon fortnightly market was likely to be short of supplies. Their arrival proved the truth of Mr. Aitchison's prophecy, "*Steam will be your Highland drover.*" At Woburn the Hereford bull has been tried upon Suffolk-polls, but the cross, which came with slugs instead of horns, somewhat lacked flesh and cha-

racter. When a Short-horn bull is used the produce retains the horns, with deeper flesh and more size, and is generally shot with grey hairs on the quarter and under the belly. With Ayrshires the Hereford bull has "nicked" admirably wherever we have met with it, and three-year old steers so bred have made from 30*l.* to 40*l.* off grass. Their colour is nearly always red and white in large flecks, and the head a good open one, with the Hereford colour and horn. One so bred, and weighing 160 stone, of 8 lbs., at three off, made 60*l.* in a Woburn auction for Christmas beef. Hereford on Alderney is also a success, and the calves not unfrequently follow the colour of the bull, only with a much darker shade of red. The cross improves the feeding-power of the Alderney, and a cow of the first cross will be quite as good "a cream-stainer" as her dam. The union of Devon and Hereford has been tried, but the produce were lacking in activity, and did not "farm the Devonshire hill-sides" like the original Devon. Mr. Welles records the failure of the Herefordshire breeders to cross their white-faces with West Highland kyloes, which communicated their wild temper to the progeny, and did nothing for the beef; but Mr. Naylor succeeded to his heart's desire when he put them to Galloway polls, and found that the calves could stand the nip of a severe winter on the Long Mountain under Moel-y-Mabb, even better than their hardy dams. The Shropshire was once upon a time more of a smoky-faced brindle, until it was "crossed up" about Pontypool and Welshpool with the Welsh and Hereford cattle, and took the coat of the one and the face of the other. Still their ancestry will hardly repay inquiry, and has, no doubt, much in common with the Montgomeryshire and Glamorganshire breeds, both of which are nearly extinct. When they could claim to be a pure breed, the Glamorganshire, except in its superior size and bone, seemed to bear an affinity to the Devon; and the Montgomeryshire, with the substitution of black for red, was very like a Hereford in its colour-marks.

To conclude, few counties south of Shropshire lack the Hereford bullock element. Surrey was represented in their ranks at Leeds, and eleven other English and Welsh counties at Battersea. They have pushed their way into Cornwall, and Ireland reports pretty well of them. The late Messrs. Rea did a good business with Jamaica, and one importer recently won prizes for crossbreds by them in seven classes; in one of which lots of eight steers were shown, after the Forres fashion. Canada has welcomed them, and in 1820, Henry Clay, the statesman, imported two pairs of heifers, and is said to have thought them as good "fill-pails" as the Short-horns. Mr. Corning, who has had them for nearly thirty years on the banks of the Hudson, about three miles below

the city of Albany, and who took the precaution of laying himself in with well-bred ones at 100*l.* per head delivered, speaks of them as thriftier than the Short-horn, very active in the plough, and, on the whole, better suited for the western prairies than the richer pastures of the States. The Australian settlers decidedly prefer them to the Devons on the pampas, from the fact, *inter alia*, that they have not half their pace, and take so much less catching. On the continent they have gained no great hold, and in the ranks at Poissy you very seldom find them. Still, if their ramifications are not nearly so wide, and if they have not shown the same peculiar aptitude for crossing as the Short-horn, it must also be remembered that, as a breed, they have been maintained principally by struggling tenant-farmers, and have not had one-twentieth portion of the money expended on them. They may, however, "rest and be thankful" with their bullock-patent. Disputes, which may run high in the pastures or over "cakes and ale," as to relative goodness of breeds, are all levelled by the kitchen spit. Men know no politics in boiled or roast, and history will not inquire what ox is supposed to have produced the "Baron," which Hogarth's lean sentinel apostrophised at the gates of Calais:—

> "Oh! rare rosbif! loved by mankind, if I were doomed to have thee,
> All dressed and garnished to my mind, and swimming in thy gravy,
> Not all the country's force combined could from my fury save thee."

XVIII.—*On Clover Allies as Fodder Plants.* By James Buckman, F.L.S., F.G.S., &c., Professor of Geology and Rural Economy.

In a former volume of the Journal (Vol. II., s.s., Part 2) I described the different species of the true clovers, the genus Trifolium. This paper will have reference to a series of plants of the same natural order—Papilionaceæ or Leguminosæ—all of which have been found more or less useful as fodder plants, and in this light alone they will be considered.

The plants to be reviewed belong to the following genera, and are subdivided according to their foliage.

Leaves.			
Pinnate. Each leaf consisting of several pairs of leaflets.	I.	Vicia	Vetch.
	II.	Faba	Bean.
	III.	Pisum	Pea.
	IV.	Onobrychis	Saintfoin.
Trifoliate, consisting of three leaflets.	V.	Lupinus	Lupin.
	VI.	Anthyllis	Lady's Fingers.
	VII.	Melilotus	Melilot.
	VIII.	Lotus	Bird's foot trefoil.
	IX.	Medicago	Medick.

BIFOLIATE. Two leaflets.	X. Lathyrus	Vetchling.
SPINOSE. Thorny.	XI. Ulex	Furze.

I.—VICIA—VETCH, TARE.

In this genus we have plants with about six pairs of leaflets to each leaf, the terminal or end leaflet being transformed into a tendril. The genus includes the following species which have formed subjects for experiment with a view to cultivation.

Vicia angustifolia, Narrow-leaved Vetch.
Vicia angustifolia, var. sativa, Farm Vetch.
Vicia cracca, Tufted or Cow Vetch.
Vicia sepium, Bush Vetch.

Some fifteen years since I gathered some seeds of the *Vicia angustifolia* with a view to experiments, which were carried on for about five years; and it may briefly be stated that from a plant only a few inches in length was obtained one measuring more than three feet, and that the seeds, which when first gathered and partially dried weighed on an average half a grain each, were first, after cultivation, doubled, and then, by selection, soon trebled in weight: the larger seeds being chosen for this ennobling process.

These experiments showed how easily cultivated plants may be produced from even unlikely wild forms, and if so, how readily varieties may be introduced; nay, more precisely, that our cultivated vetch, *V. sativa*, is but a cultivated form of the *V. angustifolia*.

The increase in size and weight of vetch seeds by cultivation and selection has an important practical bearing. In order to show this I some time since selected from a market sample of vetches two hundred seeds of three sizes, which I will distinguish as—1, *small*; 2, *larger*; and 3, *largest*. These on being weighed and measured gave the following results:—

	Seeds.	Weighed in Grains.	Measured in Drachms.		To the Bushel Seeds.
1.	200	210	$3\frac{1}{2}$	=	585,728
2.	200	330	6	=	563,200
3.	200	865	$16\frac{1}{2}$	=	492,086

The seeds were planted in plots of equal extent, and yielded fodder almost in proportion to the size of the seed, that of (3) greatly preponderating. From this and subsequent trials in field crops I am convinced that the larger even-sized vetches are the best for seed and most profitable, in spite of hardy assertions to the contrary often heard at market.

Though the *V. cracca* naturally seeks the support of bushes, it

can yet be grown without. Its yield, however, does not entitle it to rank with the common vetch; neither does that of the *V. sepium.* By experiment I have found the seeds of both varieties most uncertain in coming up, and though possibly continued cultivation may greatly alter both plants, I can see no reason to expect them ever to be of the value of the first species.

II.—Faba—Bean.

The use of the seeds of the *F. vulgaris*, common bean, is well known, but the value of the whole plant as fodder is little understood. The Scotch farmers, when growing beans for pulse, cut them at least three weeks earlier in their ripening progress than is done in England, and they find that the haulm is valuable for fodder, whereas in England it is commonly considered to be all but useless. This might form a subject for experiment; my reflections, however, took a different turn. Crops of beans are often found in which the formation of pods is reduced to a minimum; therefore to let the plant blacken upon the land only to be cut for rough litter is extremely wasteful. In a case of this kind in the dry summer of 1863 I cut down the stalks soon after the abortive flowers had dropped, some of which, in the green state, were eaten by horses and cattle, which relished and seemed to do well upon them; while the rest, dried into hay and cut up with the chaff, were eaten greedily, and appeared to be a valuable food. Indeed, I believe that the bean would make a valuable plant to grow for fodder, yielding, as it might do, a crop of hay twice the bulk and weight of clover in time to be succeeded in the same season by turnips or late rape, to be followed by either barley or spring wheat.

III.—Pisum—Pea.

The *Pisum arvense* in all its varieties is probably derived from the wild sea-side pea found sparingly on our shores, as also in parts of Europe, Asia, and America. The *P. maritimum*, with its purple flowers, more nearly approaches our purple field varieties than those of the garden, though the white garden peas are extending into arable culture.

The pea, like the bean, has been grown almost exclusively for its seed, but probably it may in many cases be more profitable to gather it as a great fodder plant before the seed arrives at maturity; as stock will eat the green plant most greedily. An analysis of the whole plant shows how valuable the dried herbage must be, more especially for growing animals, owing to its high percentage of nitrogenised, or flesh-forming substances; it is also rich in sugar and the supporters of respiration.

100 *parts of Peas, unripe Straw, and Fruit, contained.*

	Air, Dry.
Water	13·050
Nitrogenised or flesh-forming constituents	17·975
Substances not containing nitrogen applied in the animal economy to support respiration or to lay on fat:—	
a. Soluble in a solution of caustic potash	35·965
b. Insoluble in a solution of potash	28·760
Ashes	4·250
	100·000

IV.—Onobrychis—Saintfoin.

Onobrychis sativa.
Onobrychis sativa, var. bifera.

These two names indicate the varieties in the market, the peculiarity in the second form being a capability of producing two crops of foliage and flowers in one season.

The *Onobrychis sativa*, Sanfoin or Saintfoin is, according to Bentham, "a native of limestone districts, in central and southern, and temperate Asia; much cultivated for forage, and occasionally naturalized further northward; in Britain believed to be truly indigenous in southern and eastern England, but not recorded from Ireland."

In England it is extensively cultivated on the central or Cotswold range of hills, whereon the oolitic limestone extends; for, like the *Papilionaceæ*, in general it delights in calcareous soils, and its mode of growth peculiarly adapts it to the thin lands by which calcareous rocks are so often covered. The plant is remarkable for possessing a long tapering root-stock, which descends deep into the crevices of the substratum. I have traced it for as much as five feet in a downward direction, more or less straight, according to the amount of resistance; and as this root-stock is perennial its lateral ramifications become more and more strongly developed, and so, in spite of the thinness of the soil, the abundant herbage of the plant is maintained; its inorganic elements being derived from a depth inaccessible to most other species. These substances are thus brought to the surface, and if the plant be wholly depastured, are left behind as an augmentation of the usually thin surface soils which pertain to where it is cultivated, so that besides being in itself a useful plant for its forage, the Saintfoin may be truly looked upon as a pioneer of fertility in stony calcareous soils.

The crop, though truly perennial, dies out more or less rapidly in proportion to the quantity of hay made from it, and the age of the plant when cut; if, therefore, Saintfoin is to be

maintained in vigour, the best method to obtain profit by its growth is by depasturing or early cutting.

The seed of Saintfoin is sold in two forms;—namely, *whole*, that is each seed covered by its short somewhat triangular-wrinkled legume; and *milled*, in which case the legume or husk is removed, and the kidney-shaped pea-like seed, about twice the size of a clover seed, is naked. Farmers usually employ the unmilled seed as it is cheaper, but, unless very carefully chosen, it may in the end turn out to be exceedingly dear, for the seeds of the *Poterium Sanguisorba* (or False Burnet) so much resemble it, in their rough outside and light brown hue, that, although altogether differing in shape, being oblong and four angled, they are often not detected. Now the sheep which so highly relish Saintfoin will not eat Burnet unless starved down to it, besides its growth is so much taller and coarser than Saintfoin, with a quantity of root-leaves stretching all around upon the surface of the soil, that it takes up a deal of space to the hindrance of the more nutritious plant, and, consequently, is a highly mischievous weed. Bad, however, as its presence is, there can be no doubt but that it is increasing very rapidly wherever Saintfoin is cultivated. Some notion of the amount of weeds to be found in Saintfoin may be gathered from the following cases:—

Estimate of a Crop of Saintfoin in Berkshire—third year of growth.

	Per Cent.
Saintfoin	10
False Burnet	50
Other weeds	40
	100

Estimate of a Crop of Saintfoin at Cirencester—third year.

	Per Cent.
Saintfoin	5
False Burnet	25
Bromus mollis, with occasional commutatus and racemosus varieties	40
Bromus sterilis	15
Other weeds	15
	100

My own crop of the second year, at Bradford Abbas, has a fair sprinkling of *Bromus secalinus*, a grass by no means common in the district, and it may therefore be concluded that the seed was brought in with that of the Saintfoin. This crop was grown as an experiment on the sandy beds of the inferior oolite, and yielded a large quantity of hay the first cut, but it is far less permanent here than in more calcareous soils, and is now, in its third year, nearly exhausted.

Again as regards the varieties of the *Bromus mollis*. The true *mollis* is found everywhere, but in most districts one or the other, and indeed very generally, all of the following forms have been but recently introduced. Such are *Bromus secalinus, Bromus commutatus, Bromus racemosus, Bromus arvensis;* all of which are becoming common in Gloucestershire, where ten years ago the three first were somewhat rare to find, whilst the latter has not been a denizen on the Wolds more than about ten years; in most cases their introduction can be traced to Saintfoin.

Indeed to such an extent is "whole" seed mixed with weeds, that I have counted as many as 370 weed seeds, principally those of false Burnet, in a pint, equalling the enormous number of 26,680 weed seeds in a bushel; enough of such a plant to take possession of the soil in two or three seasons. It must then be safer to buy the "milled" seed, as that is far less likely to be mixed with foreign matters. Saintfoin is usually sown with barley, and should be drilled either between the drills of barley when that crop is so sown, or else across the barley drills; if the *whole* seed be broadcast it is "so light, that in harrowing the ground too much, it is apt to be again brought to the surface." —(*Stephens.*) When made into hay it should be cut as soon as the first flowers (that is, those at the base of the spike) show themselves; the advantages of this are:—

1st. The hay is so much better.

2nd. The second crop of green leaves is so much more abundant.

3rd. The weeds will not have ripened their seeds so as to spread the pest wherever the hay is used.

4th. The duration of the crop will be ensured.

If depastured it furnishes a tolerably early feed for sheep, and may be eaten off as often as three times. This plan is of great advantage where the soil is thin, as the whole matter is retained; and the Saintfoin is thereby made a means of ameliorating the soil.

V.—Lupinus.

Various forms of garden Lupines have been employed as fodder plants, amongst them the yellow, white, and blue varieties. I have experimented largely upon the last two in marls, in stiff clays, and on poor sands, and have found that they succeed best on light soils of a poor description, which, indeed, constitute their chief recommendation. It is, however, a very uncertain crop, as plants of two feet high can be grown one year, while in the same kind of soil scarcely six inches will be attained in another. In my field and garden trials, after the

crop has occupied the land during the whole of the warmer part of the year, I have seldom obtained much ripened seed; and although according to Dr. Voelcker his analysis shews that Lupines contain fully as much flesh-forming matters as the best linseed cake, and a larger amount of ready-made oil than peas, beans, and other leguminous plants, there is reason to believe that the seed so analysed was of foreign growth, and more perfect than that usually raised in this country. The bitter principle in the seeds may be of use in pharmacy, but neither the seed nor the light hairy-woolly foliage is of sufficient importance to render the Lupine at all a valuable acquisition to either our Cereal or Fodder List.

VI.—Anthyllis—Lady's Fingers.

Having written upon the varieties of *A. vulneraria* so recently as last year—see 'Journal of the Royal Agricultural Society,' Vol. II., s. s., part 1., page 161—I have little to add, except that the plots then reported upon are now exhausted, so that it is not so permanent as I had once conceived.

The general results of my experiments lead to the conclusions —1st. That lady's-fingers can be much improved by cultivation. 2nd. That this plant can only be grown to a profit in tolerably good soils. 3rd. That when repeatedly sown on poor land it is apt to be too hairy and vapid either for green feed or the rick.

VII.—Melilotus—Melilot.

Of this genus we have two native species, namely:—

Melilotus officinalis, Yellow Melilot.
Melilotus leucantha, White Melilot.

Yellow Melilot, which is often met with quite as a weed in our corn-fields, is also a frequent inhabitant of waysides and waste places. In cultivated land White Melilot is found less frequently. The seeds of the so-called Bokhara Clover from Asia, and the Cabool Clover from India, are larger than those of our White Melilot and produce large succulent plants nearly a yard high, but apt to get hard and woody with age.

The Yellow Melilot is smaller, and not inclined to be woody; but both species are remarkable for yielding a bitter aromatic principle, identical with that of *Fenugræc seeds*, so much used for flavouring cattle foods.

Reasoning upon this subject induced me to try a slight admixture of Melilot in mixtures of "seeds"—Ray and Clovers; the object being to impart additional flavour to seed hay, which is often less aromatic than meadow hay, the latter being flavoured

with sweet vernal grass—a species which, curiously enough, is highly endued with the same bitter and aromatic principle found so abundantly in the Melilots. For my purpose I chose the White Melilot,—though the yellow would doubtless answer as well,—mixing at the rate of half-an-ounce to an acre in the clover seeds,

My experiment in this way has proved so successful that I have now a 50 ton rick of clover hay which cannot be excelled for aroma and quality.

I may here mention that the Fenugræc—*Trigonella fœnum-græcum*—might be used in the same way, as its herbage and seed are aromatic, but as it is a decided annual its seed could not be sown with the clover, than the seed of which it is so much larger. I have, therefore, adopted the plan of sprinkling over each load of vapid or badly made hay a small quantity of the powdered seeds of Fenugræc, much to the delight of my cattle.

This is the only way in which the Melilots can be used, as they contain too much flavour to render their use as self-crops at all desirable, but I feel certain that the small admixture I have indicated will be of benefit in artificial pasture, whether for green food or the rick; it would also, probably, impart additional flavour to the meat fed upon it.

VIII.—Lotus—Bird's-foot Trefoil.

Lotus corniculatus, Small Bird's-foot of the Meadow;

Lotus major, Larger Bird's-foot of the thicket and hedgerow in damp soils, are the two only species of agricultural importance. The former, valueless as a self-crop, may be advantageously mixed with seeds in laying down permanent pastures in light soils.

I have grown the larger species repeatedly, and consider it more valuable than some of the newly-vaunted clovers and clover allies. It is calculated to yield a large crop in positions which would be far too wet for the successful growth of most other plants of this tribe. I have always sown it in drills about six inches apart, and have succeeded in getting an uniform plant of a foot in height.

IX.—Medicago—Lucerne, &c.

Medicago sativa, Lucerne, flowers purple.

Medicago lupulina, Nonsuch Hop Trefoil of the farmer, flowers yellow.

Lucerne is well known as a valuable soiling plant. It yields a large quantity of good herbage at a very early period of the

year, and will bear from two to three cuttings in the same season. It is highly perennial, more especially if it be not too far advanced in growth at each cutting, and if kept well weeded. It is much relished by horses, on which account a small breadth of it is commonly grown near the homestead.

The hop trefoil of the farmer—not of the botanist, as this name is by him bestowed upon the *Trifolium procumbens*—is distinguished by the slightly twisted black legumes or seed-pods. It is a valuable plant for mixing with clovers, saintfoin, ray, and the different artificial grasses; it yields a large quantity of nutritious produce, highly important in the rick as it fills up the bulk at the bottom, adding quality and increasing the variety of the food—in itself a great advantage.

It does not yield sufficient weight as a self-crop, though for the reason stated it adds greatly to the weight of a seed crop.

X.—Lathyrus—Vetchling.

Of this fine genus of plants it will only be necessary here to describe the following native species :—

Lathyrus pratensis, Meadow Vetchling, flowers yellow; leaves, bifoliate, with terminal tendrils.

Lathyrus aphaca, Yellow Vetchling, flowers yellow; leaves only seen in young plants.

Lathyrus sylvestris, Wild Hedge Pea, flowers purplish green.

Of these the first two have not made sufficient growth in my plots to warrant me in recommending them for self-crops. The *L. pratensis* might be mixed in permanent pasture, but should be employed sparingly, as otherwise it would overpower the rest of the herbage.

The peculiarities attending the herbage of the *L. aphaca* are —that in seedling plants it commences by throwing out bifoliate leaves, as these are afterwards diverted into long flexile tendrils, the stipulæ are enlarged to perform the leaf function. Hence this plant, without possessing any true leaves, is capable of producing a large quantity of green herbage.

The tall everlasting pea naturally grows in thickets and hedge-rows, but in experimenting upon it in open ground, I found that the seeds germinated readily, and the plant grew rapidly; it is however in the second year that it presents its thick mass of matted foliage and pea-pods, and when these are about half ripe the plant is fit for green food, or to be made into hay. It is highly relished by stock, but on account of the length of its flexile stems it should be coarsely chopped into lengths when green, or cut into chaff in the dried state.

I had a fair sized plot of this in operation for several years,

and found it more perennial in its habit than most of the clover allies. I feel convinced that it might be made a very useful addition to our list of fodder plants.

XI.—Ulex—Furze, Gorse.

The *Ulex Europæus* in its adult state is a plant without leaves, but, if the progress of its growth be traced from the seed, it will be found much as follows:—Its cotyledon or seed-leaves are oval; the second leaves have a petiole or foot-stalk, broad for their size, with a small leaflet on either side near the apex. The next set of leaves have merely the petiole, after which the leaves become wholly spinose. Now, as these spines, into which the tips of the branches divaricate and which the leaves form, get more and more woody and hard—with age, slowness of growth, or poverty of soil—it follows that furze when old requires to be mechanically prepared before it can be eaten by cattle without inconvenience; hence an upright wooden mallet, having the lower end tipped with iron, has been used to bruise the plant; where largely grown, iron rollers are employed for its more expeditious and certain preparation.

Some thirty years ago it was grown so extensively as to warrant the purchase of expensive machinery, but its claims are now perhaps more loudly asserted than ever. This is perhaps attributable to the natural propensities and habits of the plant, which delights to grow on poor sandy heaths and commons; its chief recommendation being that it can be made to occupy extremely poor soil. It must however be borne in mind that the poorer the soil the less succulent the plant; indeed it seems almost an axiom that plants of high feeding properties require good soils for their cultivation, and that plants which grow spontaneously on poor soils do not possess such good qualities.

Let not the reader suppose, however, that I would condemn the furze on these grounds, as I feel convinced that if properly cultivated on tolerably good soil, its feeding properties will be greatly enhanced, so as to become worthy of attention, more especially as it takes so little from the land. As it may be interesting to know the amount of solid matter taken from the soil by furze and kindred plants, I extract the following from Johnston:—

Percentage of Mineral Ingredients taken from the Soil.

	Green.	Dry.
1. Lucerne	2·6	9·5
2. Red clover	1·6	7·5
3. White clover	1·7	9·1
4. Furze	0·82	3·1

Whether these notes would equally apply to all the forms of

furze, such as *Ulex Europæus*, Common Furze; *Ulex strictus*, Irish Furze; *Ulex nanus*, Dwarf Furze, I cannot say, but I should think that, for its upright habit and green soft growth, the preference should be given to the *Ulex strictus*. If so, it is a matter of no little interest to know that this plant, now so strongly recommended for cultivation, was first observed in Lord Londonderry's Park, county Down.

Hence, then, before I come to a conclusion, it behoves me to try this dispassionately, as in all probability it may differ even more in its qualities than in its botany.

In sowing I would recommend it to be drilled in spring in rows as much as 18 inches or 2 feet apart, so that it may be well cleaned from weeds in summer; hoeing will greatly assist its growth.

The first crop will be small, but it should be cut the first year in order that it may stool out in the following spring; when, if it has taken well to the soil it will be a thick mass of delicate green herbage in the second summer; and from this point its expansion will be more rapid according to circumstances; it should be used as young as may be, as otherwise it is hard and woody, more difficult to prepare for cattle, and less nutritious.

In concluding these remarks upon the clover allies, it only remains for me to recommend their more careful study to the agriculturist, and more especially to students in the profession; as, apart from the great interest excited in the mind by their beauty and peculiarities of structure, much good may be done by carefully experimenting and collecting facts connected with a family of plants from which we already derive much that is good and practically useful.

Bradford Abbas, Sherborne, Dorset,
August 2, 1867.

XIX.—*On the Composition and Nutritive Value of Trifolium striatum, a new kind of Clover.* By Dr. Augustus Voelcker.

A new description of clover—the *Trifolium striatum*—improved by a few years' cultivation, has lately been introduced into agriculture.

This plant is said to grow on every description of land, that which is clover-sick included; it certainly grows on the poorest sandy soils, whereon broad-leaved clover either altogether refuses to grow or produces but a miserable crop.

Trifolium striatum is very hardy, well suited for dry land, and better capable of resisting injury by frost than other varieties of

the clover family. In these days of clover failure, it may therefore become valuable as a substitute for some of the sorts now under cultivation.

Amongst the published clover analyses, that of *Trifolium striatum* is not given. I therefore availed myself of the opportunity that presented itself of ascertaining the composition of a fair average sample, grown on a poor sandy soil in the neighbourhood of Biggleswade; and, without further preliminary remarks, I give its general composition, in the condition in which it was received, and perfectly dried at 212° Fahr.

Composition of Trifolium striatum.

			Calculated Dry.
Water	55·46	....	..
*Organic matters soluble in water	6·76	....	15·20
Organic substances insoluble in water (crude fibre)	34·40	....	77·22
Mineral matters (ash)	3·38	....	7·58
	100·00		100·00
*Containing nitrogen	·92	....	2·06
Equal to albuminous compounds (flesh-forming matters)	5·75	....	12·87

The specimen analysed by me, it will be seen, contained only 55½ per cent. of water, or considerably less than the average proportion in clover when green. As the average proportion of water in the various kinds of clover generally amounts to from 78 to 81 per cent., the trifolium analysed by me may have been left too long in the field before it was cut down, and have thereby become drier and more woody than it would otherwise have been.

Trifolium striatum in its best condition is not so succulent or so leafy as common red or white clover; but the specimen examined by me appeared to be exceptionally stalky and rather over-ripe.

The following figures express the detailed composition of *Trifolium striatum* in its natural state, and dried at 212° Fahr.:—

	In Natural State.		Calculated Dry.
Water	55·46	....	..
Oil and wax	1·52	....	3·39
*Soluble albuminous compounds	3·79	....	8·50
†Insoluble albuminous compounds	1·96	....	4·40
Gum and sugar	2·96	....	6·70
Digestible fibre	12·64	....	28·37
Indigestible woody fibre (cellulose) ..	18·29	....	41·06
Soluble mineral matter	1·66	....	3·72
Mineral matter insoluble in water	1·72	....	3·86
	100·00		100·00
*Containing nitrogen	·606	....	1·36
† Containing nitrogen	·314	....	·70

Good red clover in a dried state contains on an average 3¾ per cent. of fatty matter, 18 per cent. of albuminous compounds, and 27 to 28 per cent. of woody fibre. Meadow-hay in the same state 3 per cent. of fatty matter, 10 per cent. of albuminous compounds, and about 36 per cent. of woody fibre.

A comparison of the preceding analysis with the composition of good red clover and with meadow-hay shows:—

1. That the specimen of *Trifolium striatum* examined by me contained about as much ready-made fat as meadow-hay and somewhat less than clover.

2. That it was rather richer than meadow-hay in albuminous compounds, and contained about one-third less of these compounds than red clover.

3. That the proportion of indigestible woody fibre in the *Trifolium striatum* was much greater than it is on an average in red clover and meadow-hay.

I purposely abstain from drawing any practical deductions from the preceding analysis; for, although it shows that the sample analysed by me abounded in woody fibre, it does not follow that *Trifolium striatum* generally contains so large an amount.

In my paper on the growth of clover and its composition at different periods of its growth, I have shown that the amount of woody fibre rapidly increases towards the end of the process of vegetation of the clover-plant, and pointed out the serious loss in nutritive matter which takes place when clover is allowed to become over-ripe before harvested.

It is quite possible that the sample when it reached me was over-ripe. Nevertheless I place the analysis on record, in the hope of having another opportunity of receiving the *Trifolium striatum* in a less advanced stage of growth, and for the special purpose of directing the attention of light-land farmers to a species of clover which is likely to be of considerable value on sandy soils where broad-leaved clover does not succeed.

11, *Salisbury-square*, *Fleet-street*,
Feb. 1, 1868.

XX.—*On the Construction and Heating of Dairy and Cheese Rooms.* By Joseph Harding.

Prize Essay.

Dairy farming forms an important branch of the agricultural economy of our country, and its produce is of scarcely less moment in a commercial point of view. Cheese (of which I intend more especially to speak) is the staple commodity of some of our counties, and, as compared with the produce of other countries, occupies the first place; for though the Parmesan, the Roquefort, the Gruyere, the Port de Salut, and several other French and continental cheeses, are respectively good of the kind, they are not equal to the best English cheese for substantial character, and universal adaptation to clime and taste. The fact of our method of manufacture being imitated by many foreign cheese-makers is in itself an acknowledgement of our superior excellence.

Our improvements of late years in cheese-making have been many and important. Dr. Voelcker, in his Essays on 'Milk and Cheese,' given in vols. 22, 23, and 24 of the 'Royal Agricultural Journal' (which every dairy farmer should read and study), has contributed important additions to our stock of scientific knowledge, which, when practically applied, enable us more easily to convert our milk into cheese, perfect and pure in flavour.

But with all our improvements hitherto we have omitted the most important. Our scientific knowledge and practical skill will fail to succeed in the absence of (1) a proper Dairy, in which the milk can be kept sweet; and (2) a Room to ripen the cheese.

Throughout our dairy districts most of the farm-houses are old, having an old-fashioned dairy-room attached, or immediately under its roof, ill-ventilated, often damp and filled with impure air, and not unfrequently in close proximity to stables, piggeries, &c. It is a mistake to deposit so pure and delicate a material as milk in such places. The amount of loss annually sustained thereby is almost incredible; many hundred tons of cheese, being in consequence thereof made of an inferior description, are sold at 1*d.* to 2*d.* per lb. below the price which ought to be realised; whilst in hot and unfavourable seasons, such as we occasionally get, many tons fall to pieces and perish. It is not however to defective accommodation alone that our large quantity of inferior cheese is due; a rather large share belongs to defective skill in the art of making cheese, which can no longer be sheltered under the old-fashioned plea "that good cheese could never be made from such pastures." Chemical researches, and unquestionable practical experience, prove that

good cheese may be made from all ordinary pasture-land. A remedy for defective skill will, in the absence of prejudice, be found in proper dairy accommodation, and a little instruction. The farmer cannot afford to make inferior cheese from whole milk, nor should such a loss be imposed on the commonwealth. The manufacturer of wares may make goods of first and second-class quality, and from the latter he may realise the largest profit, but it is not so with the farmer: the same milk from which he produces inferior cheese, would as easily, and at the same expense, yield fine cheese, but with very different pecuniary results.

As soon as milk leaves the cow, the progress towards decomposition in it commences, at a rate determinable by external influences—such as a healthy or an unhealthy atmosphere. If in our hot summer nights milk be deposited in an unsuitable room, or come in contact with the effluvia arising from gutters or other noxious places, or if meat be hung in its vicinity, it will readily take the taint, and not as some imagine throw it off in the whey, but retain it in the curd to ripen with the cheese, wherein the flavour will not be mistaken.

Our best cheese is made once a day; and it is necessary that the milk should have lost its animal heat before the process of cheese-making commences. It is true this cooling may be hastened by plunging the vessel containing the milk into cold spring water, but it is far better that nature should perform her own work by reducing it to the required temperature, in a dry, clean, open, and well-ventilated room during the night, when the morning's milk, possessing less animal heat, may be added to it with safety, and the rennet be at once introduced. In order to ensure a *fine* cheese the milk must be perfectly sweet, that the operator may have entire control over it, and be enabled to mould the future cheese as her skill suggests. If the milk has by any means become acidified, though to so small an extent that litmus paper fails to represent the change, it will sometimes discover itself in some stage of the process, to the surprise of the dairy-maid, and will completely baffle her skill.

It is therefore indispensable to the success of making cheese that proper accommodation should be provided, on every dairy-farm, for keeping milk sweet for at least twelve hours, or from the evening's to the morning's milking. Our fathers appear to have had but one object in view, viz., shelter from the sun's rays; but, however desirable a cool dairy may be, unless it be also thoroughly dry and sweet, milk will keep longer in a situation exposed to all the vicissitudes of the weather in a higher temperature. If it were placed in the open field there would be little doubt of its keeping sweet through one of our worst summer

nights, and I question if art can much improve upon the method which nature indicates. Still in the construction of our dairies, superfluous means of ventilation, such as gratings placed under or between the windows, should be avoided, as it is difficult to keep them air-tight in cold weather; but a sufficient number of windows properly arranged will be found advantageous.

Dairy Room.

The best position for a dairy, with cheese-room over it, is behind a dwelling-house which has a south aspect; it should not be under the same roof, but be a detached and separate building, lying longitudinally north and south, or it may be connected only on the south end with the boiler house, having a communication with the dwelling. At the side of the boiler-house, and parallel with it, may be the scullery; this would leave the dairy buildings standing out clear of all impediments to the free circulation of pure air. All outhouses, stables, piggeries, cow-houses, &c., should be as far distant from it as possible. The dairy-room should be capacious and lofty (10 feet in height), so that when furnished it may still appear roomy. The floor, which should be raised (not inconveniently) above the level of the ground, ought to be composed of cement or some kind of concrete, so as to be free from joints or cracks. It should be made to incline from all sides to an escape drain, covered by a patent sink-trap. Thus the room would be easily washed, speedily dried, and kept sweet and wholesome.

The skirting should be of stone or tile, 10 or 12 inches deep. Two or more good sized windows should be placed in either side wall, not too high above the floor, nor opposite each other, and a similar one in the end; they should be set low, as it is the floor which chiefly needs ventilation. Instead of the sashes being fastened to the window-frames in the ordinary way, they may be made to slide back into a recess in the wall. All the windows ought to be provided with two, if not three sashes; the outer one of finely perforated zinc, the second of glass, and the inner one of canvas, to soften the rays of the sun. At intervals, around the room and near the ceiling, should be placed ventilators, which may be opened or shut at discretion, to allow accumulated steam or foul air readily to escape.

At a convenient height supports should be built into the wall round the room, upon which a shelf should be laid, to prevent subsequent damage to the wall for want of the accommodation.

The staircase leading to the cheese-room will be at one end, under which should be ample and conveniently arranged cupboards with shelves, for the reception of the salt, jars containing

rennet, cloths, and other things in daily use. Near this, in one of the corners, should be placed a lifting apparatus, such as may be seen at almost any warehouse, for the more easy conveyance of the cheese to the cheese-room.

The milk should by no means be brought into the dairy by the milkers; to avoid this a hole should be left in the wall nearest the milking-yard; outside should be placed a tin or zinc receiver of adequate size, and connected therewith an open conduit to convey the milk to the cheese-tub within. A stream of cold water, governed by a stop-cock, should, if possible, be introduced into the dairy. Provision should be made for conveying the whey in pipes from the cheese-tub to a capacious cistern in the piggery. The pipes may be laid either above or beneath the floor. In thus describing the dairy-room I have had regard especially to cheese-making, but in principle it is equally adapted for butter-making, the fitting-up for that purpose being simply a matter of opinion and taste. For particulars upon this head I would refer the butter-maker to Dr. Voelcker's suggestions on the subject in his 'Essays on Milk' before referred to.

Cheese Room.

In the construction of the building regard should be had to the use of non-conductors of heat in the roof, such as straw beneath the tiles, and having the tiles painted or otherwise whitened with some adhesive material. The walls should be continued a foot or two above the ceiling of the cheese-room. These precautions would do much towards neutralising the intensity of the summer heat. The windows should correspond both in position and structure with those of the dairy below. As the extent of space above will necessarily correspond with that of the dairy, it will be larger than required for the quantity of cheese made. The cheese room, however, should be smaller than the dairy, because the cheese will ripen better in a reasonably small compass, and the room will be more readily heated. A few feet, therefore, at the most convenient end, may be advantageously partitioned off, forming a useful room for the stowing away some of the summer utensils during the winter months. The room should be about 9 feet in height, with at least two ventilators either through the roof, or in the side walls, precisely the same as in the dairy—if in the side walls they should be made air-tight—to be opened at discretion.

The room should be furnished on three sides with tiers of shelves of red deal, each shelf being 1¼ inch thick. Of these the lowest may be 8 inches from the floor, the top one 18 inches from the ceiling; the distance between each shelf being regulated by

the thickness of the cheese made. The stands or racks on which the shelves are made to rest should be fixed in sockets on the floor, at the distance of 8 inches from the skirting of the wall, and the tops fastened to the joists of the ceiling.

Heating the Rooms.

It was formerly held that the introduction of heat to the dairy and cheese-room would be a very unreasonable and injurious practice, but experience has taught us that the sun's rays and a share of his heat are the best things we can have for drying and purifying both rooms, and when these become insufficient, as they do towards the winter months of the year, we must resort to artificial means to supply their place and maintain the desired temperature. Heat is not only the agent by which the whey is effectually separated from the curd in the process of cheese-making in the dairy, but without heat the cheese will not properly ripen in the cheese-room. As it is not usual to heat the dairy, large quantities of cheese are produced in the later months of the year, from which the whey has not been extracted in the process of making; the curd and whey consequently become amalgamated, ultimately forming a "pulpy" cheese which can never ripen though submitted to any degree of temperature: such cheese often proves a source of loss to the factor, and fails to give satisfaction to the consumer. The maintenance of a temperature of from 54° to 64°, during the late cheese-making season in the dairy, would very much tend to remedy the evil of "late made cheese."

The cheese-room must of necessity be heated. A Cheddar cheese, when removed from the press to the cheese-room, at three days old, contains a certain amount of moisture, but in a well made cheese this will readily evaporate in a proper temperature, and the cheese will ripen accordingly. If the temperature be low or damp, or both, the process of evaporation and ripening will be slow, and the moisture lodging in and about the rind of the cheese will cause it to be thick and white, and will damage the flavour. From observation we find that 20 cwt. of newly-made cheese will give out nearly two pounds of moisture per twenty-four hours; it follows that the sooner the room is cleared of such moisture the better. When the temperature descends below 50°, evaporation should be promoted by the addition of artificial heat, so as to expel all damp and noxious vapours from the neighbourhood of the cheese, thus facilitating its ripening and leaving it as clean and rich looking as though it had arrived at maturity in the summer months.

Various methods have been employed for heating the cheese-room—steam, hot-air, but chiefly the stove—but all are now being

superseded by hot water which is safer and more cleanly, and diffuses the heat more equably.

In the large dairies of Somersetshire, as also in other parts of England and Scotland, Cockey's cheese-making apparatus is employed, and with this is combined the heating apparatus for the dairy and cheese-room. From a saddle-shaped boiler, fixed in the boiler-house, iron pipes are laid to and from the cheese-tub in the dairy, conveying hot water to a chamber or false bottom beneath the tub. Pipes proceed from the same boiler to and surround the cheese-room, and descending from thence to the dairy, pass through it, and return to the boiler. Thus a complete system of pipes is laid, by which the milk and whey in the cheese-tub, and also the cheese-room and dairy, are heated.

A cistern, containing sufficient hot water for all the purposes of the dairy servant, stands over the boiler, and the whole is heated by one fire. To heat the dairy and cheese-room, a cistern stands in one corner of the latter, half filled with water, and this supplies all the pipes down to the boiler. As the water heats, so it circulates and does its work of heating all the way round. At the top of the cistern is a pipe communicating with the open air, and forming a means of escape for accidentally created steam.

As the water leaves the boiler it is turned in the direction required, by means of stop-cocks, and when the operation of cheese-making is completed, it is only requisite to stop one, and open another, for the heat to be transferred from the cheese-tub to the cheese-room. The pipes in the cheese-room are laid in the space between the cheese-stands and the skirting, thus throwing up the heat behind the cheese, where it is most required. With this system of heating, by a little attention, a tolerably uniform temperature of from 50° to 65° may be maintained during the winter months. It will also be found valuable, sometimes in the summer, when the atmosphere is hot and damp; if the water be set on for an hour or two, it will soon dry the room, and restore to the cheese its wonted healthiness. This is the best method of heating known to me.

Conclusion.

Whatever we do should be well done, therefore every description of cheese should be good of its kind. The finest can only be made from whole milk; second quality, but good of its kind, may be made from milk with half the cream removed; and even skim cheese may be also good of its kind; but there is no necessity that the cheese of whole milk should be made inferior, and consequently vary in value, as it too often does, from 5*s.* to 15*s.* per cwt.

To ensure success, every impediment should be removed, and

every facility rendered. When the cheese-makers of Scotland laid aside the old Dunlop method of cheese-making, and adopted the Cheddar method, they at once re-arranged their dairy and cheese-room to meet the requirements of the new system; the result is that though they may not yet quite reach the standard of excellence of our best Somerset cheese, yet they surpass us in uniformity of quality.

The Americans, who are also adopting the Cheddar system, spare no expense in providing every necessary convenience, erecting suitable factories* and cheese-rooms, and obtaining scientific and practical information from every available source. Mr. X. A. Willard, M.A., who paid a visit to the cheese-making districts of England, during the summer of 1866, in his official report, delivered before the American Dairymen's Association in the city of Utica, after speaking in the most laudatory terms of our dairy management and cleanliness, says, "*as regards appliances for producing cheese, we are greatly in advance of the English.*" Strange indeed that so important a matter as our dairy accommodation should be overlooked or neglected, seeing that the rent of the landlord and the income of the farmer are to be derived from it!

In the description of the dairy and cheese-room here given, I have had especial reference to the method employed in making Cheddar cheese, as being the most scientific yet simple, and involving the least possible labour, whilst the cheese is quoted the highest of any English cheese in the London and other markets; but the arrangement of the dairy and cheese-room, above described, is equally suited to all dairy purposes; it is inexpensive and simple, yet all that is required, enabling the best cheese-maker to produce a uniform dairy of cheese, and saving him from the mortification and loss now often inevitable.

The unskilful maker would be also benefited by having proper appliances for making good cheese.

In such a dairy of 30 feet in length and 18 to 20 feet in width, the evening milk of 50 cows may be deposited in the cheese tub, and will keep sweet till the morning, as nature requires no other assistance than a dry room and thorough cleanliness. Another great advantage is that it obviates the necessity of Sabbath cheese-making, which is everywhere felt to be so objectionable.

If our dairy farms were thus furnished, the country would derive the benefit of having a larger quantity of fine cheese, and consequently less of the inferior article.

Marksbury, near Bristol.

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* See Note, p. 310.

NOTE.—Reference has been made in the foregoing essay to the introduction of cheese factories and the Cheddar system of cheese-making into the United States of America. To these causes may doubtless be attributed the great improvement latterly observable in the best made American cheese, which now finds a ready sale at high prices among the most fastidious consumers in England. On these points much information has been diffused by means of the annual reports of the American Dairymen's Association — an institution having for its aim "mutual improvement in the science of cheese-making, and more efficient action in promoting the general interest of the dairy community." From the reports of this Association, and information derived from official sources, it appears that whereas the factory system only took root in the United States in the year 1851, and so recently as 1860 had only ramified into seventeen branches, there are at the present time, in active operation, not less than one thousand cheese-factories—working up the milk of nearly a quarter of a million of cows—and from many of them very excellent cheese of uniform quality is periodically turned out. How the idea of these factories in the first instance originated there are no means of determining; but it is a suggestive fact, as stated by Mr. Willard in a recent address to the members of the Dairymen's Association assembled at Utica, that about a century ago the farmers of the romantic village of Cheddar, at the foot of the Mendip hills in Somersetshire, united the milk of their cows for the purpose of making a large cheese; this they did alternately at each other's houses, and from that time to the present the best thick cheese of Somerset has borne the name of Cheddar. To this joint-stock method of production may probably be traced the germ of the American factory system; and it is not a little remarkable that Mr. Willard, after having seen all the different styles of cheese in Great Britain, does not hesitate to express his opinion "that the Cheddar is the only process from which the American dairyman can obtain suggestions of much practical utility." * He describes the cheese as an article of a very high standard, deserving of all the encomia from time to time conferred on it, and attributes its pure and delicious flavour to the scrupulous care and cleanliness with which all the operations from first to last are carried out in well-conducted dairies. On this point the following remarks by Mr. Willard are equally instructive and interesting, and all the more so because he does not hesitate to expose and denounce many objectionable features in ill-placed and badly regulated factories.

"The English dairyman has a cleaner and better flavoured milk than generally obtains with us. The milking is performed with great nicety, in tin

* Third Annual Report of the American Dairyman's Association (1867), p. 39.

pails. At Mr. Harding's the milkers are not allowed to enter the milk-room; the pails being emptied into a conductor at the window. The milk-rooms are perfect models of neatness. They have stone-floors, and the joints of the flagging are cemented together, so that no slops or decomposed milk can have an entrance. They are situated in a cool airy place, and the walls are of stone or of hollow brick, thus rendering them cool and of an even temperature. Every part is well ventilated, and out of the reach of disagreeable or fœtid odours. The floor, the utensils, and cheese apparatus are kept as sweet and clean as the table and crockery of the most fastidious housewife.

"This condition of things I found universal wherever I went among the dairymen; at the Royal dairy near the Queen's palace at Windsor Castle, and radiating from thence through all parts of England. Nothing connected with cheese-making abroad struck me with more force and admiration than this perfect neatness, and cleanliness of the dairy. In this respect they are greatly in advance of us; and in my opinion it is one of the chief reasons why they are able to obtain that fine, clean flavour, which is a distinguished characteristic of their choice cheese.

"There is nothing, perhaps, which indicates the progress and skill of our American manufacturers more than the fact, that they are able to take nasty milk from the hands of patrons, manipulate it among the fœtid odours of whey-slops, decomposed milk, and pig-sty emanations, and yet turn out a cheese that will compete with the great bulk of English make. But these conditions will not, and *cannot* produce the fine, delicate flavour of the best Cheddar; and it is one reason why there is such a great bulk of American cheese condemned abroad, as 'not just right in flavour.' This putrid inoculation does not show its whole character at first, but, like an insidious poison in the blood, increases from week to week, until it puts on a distinctive feature which spoils all the good materials with which it comes in contact.

"I saw American cheese abroad, perfect in shape and colour, rich in quality, splendidly manufactured, and having a bright, handsome appearance that would have placed it on an equality with the best in the world; but the trier showed a flavour that could be plainly traced to a bad or imperfect condition of the milk before manipulation. I have been extremely mortified while testing cheese abroad to catch the taste and smell of putrid rennet, and of the stables."

It would be impossible in the limits of a note to discuss the question as to how far the factory system is adapted to the habits and requirements of the British dairy-farmer, more especially in these days of self-reliance and private enterprise—two qualities which cannot be sufficiently commended and encouraged; but the following quotations derived from the trade-circular of Messrs. Morrell and Co., of Liverpool, issued on the 18th of July in the present year, show that whatever defects of management may exist in some of the American factories, the average price of factory-made cheese greatly exceeds that of the produce of farm dairies:—

Factories.	Per cwt.	Farm Dairies.	Per cwt.
Fine factory	56s. to 58s.	Very good	44s. to 48s.
Very good ditto ..	53s. to 56s.	Good..	40s. to 43s.
Good ditto	44s. to 48s.	Medium	36s. to 40s.
Medium	40s. to 43s.	Ordinary	26s. to 33s.

—Ed.

XXI.—*Danish Dairy Farming.* By JOHN WILSON, Professor of Agriculture in the University of Edinburgh.

FALSTER is one of the most fertile of the Danish isles, and contains probably the best managed and most productive estate in the whole kingdom. Mr. Tesdorpf, the proprietor, is well known as an advanced farmer of the advanced school, practically acquainted with all the details of modern husbandry, ready from his knowledge to appreciate all real improvements, and able and willing to carry them out on his farms as soon as he is satisfied that they are sound and suitable.

The entire herd of dairy cows—368 in number—are of the Angel breed. Mr. Tesdorpf considers that this breed gives a larger yield of milk, in proportion to its size and weight, than any other breed. By judicious selection in breeding, and care and good feeding from the birth, his stock has acquired proportions and points far superior to what are usually to be met with in its native districts, and he is sanguine that in the course of a few years he will have secured a herd with milking qualities of a very superior description. The milk produce of each cow is noted daily, and the best milkers are put to the best bulls, and each year fresh heifer blood is bought in from the choicest stocks in Slesvig, and a fresh bull obtained from a well-known herd in Zealand. The cows are kept for half the year in the byres, and the other half in the fields, where they are tethered in the usual way until September, and then allowed to go loose. The strong feeding they receive in the byres during the winter, aided probably by the want of proper exercise, causes a rather large percentage to miss being in calf. The loss, too, by milk fever after calving is rather high, being about 2 per cent.

The general management of the dairy is on the most improved system; any improvements that are made, either in the manipulation of materials, or in the utensils used, are from time to time introduced. Besides a large staff of dairymaids and assistants, there is a small 3 horse-power steam-engine to do all the heavy work connected with the dairy. It grinds corn, &c., for the cows, works the churns, and supplies steam for the preparation of the milk for cheese, and for cooking the food as well as warming the chambers of the persons employed in the dairy. The whey from the cheese vats is carried by means of a pipe direct from the dairy to the piggeries.

The following tabulated statement of the dairy returns made up for the four quinquennial periods specified, not only testifies to the care and exactitude with which the "Farm Accounts" have been kept, but also gives an analysis of the dairy returns of

a farm for a longer period, upon a larger scale, and with a greater minuteness of detail than has ever before been published.

The clear profit of the dairy is shown in the table on page 314.

The cows after calving time, have yielded milk on the average as follows (see Table, p. 315).

After tabulating the dairy returns, the milking qualities of the cows are divided thus:—

COWS GAVE MILK.

Year.	Under 1000 Pots per Cow.	From 1000 to 1500.	From 1500 to 2000.	From 2000 to 2500.	From 2500 to 3000.	From 3000 to 3500.	From 3500 to 4000.	Over 4000 Pots per Cow.
1861	6	17	24	50	67	36	13	3
1862	9	15	36	44	69	32	9	4
1863	3	5	21	39	57	59	25	5
1864	6	3	22	29	56	62	28	13
1865	2	9	21	29	53	55	35	15

In regard to the quality of their dairy stock generally, I think that in all probability it would be improved by a judicious introduction of some of our blood—Shorthorn, Ayrshire, or Jersey. In the management of all their leading dairies the old arbitrary "rule of thumb," which still holds sway over too many of ours, has entirely disappeared, and a philosophic treatment, based on sound scientific principles, is the rule and not the exception. The experiments quoted testify to its advantages. The dairy now, instead of, as of yore, being the abode of ignorance, and often too of superstition, is the centre of an enlightened and regular manufacture, where certainty replaces chance, and where the waywardness of the dairymaid is checked and controlled by the daily account she has to give of the produce committed to her, while her skill and attention are encouraged by the registered returns. When Mr. Friis showed me his "Dairy Register Sheet," I expressed my fears that any attempt to introduce such an elaborate system of analysis into the dairy farms of this country would have a very serious mental effect upon our dairymaids, which would at once stop our proceedings. He replied that on first showing it to his own head dairymaid she burst into tears, and continued in a very distressed state of mind for a full week afterwards. As she regained her composure, a few figures were seen chalked on the board; these rapidly increased, until they reached the last column, when she acknowledged freely the value of the daily details, which testified to her own skill while recording her dairy returns, and declared that she would

Year.	Number of Cows.	Milk per Cow—Pots.	Money received for sold and used Milk.	Butter Produce.		Pots of Milk used to 1 lb. of Butter.	Received for Butter.	Cheese Produced.		Received for Cheese.	Received for Fat Cattle and Hides.	Received for Swine.	Renewal of the Stock of Cows and Heifers.	Gross Income after subtraction of the Contribution.		Dairy Expenses.	Clear Profit.		Fodder for Cows—*Corn*, *Bran*, and *Oilcakes*—to the amount of	Fodder for Swine—*Corn* and *Bran*—to the amount of
				In all.	Per Cow.			In all	Per Cow.					In all	Per Cow.		In all	Per Cow.		
1. Ourupgaard Dairy.																				
			Rdl. sk.	lbs.	lbs.	Pots.	Rdl. sk.	lbs.	lbs.	Rdl. sk.	Rdl. sk.	Rdl. sk.	Rdl. sk.	Rdl. sk.	Rdl. sk.	Rdl. sk.	Rdl. sk.	Rdl. sk.	Rdl. sk.	Rdl. sk.
1850	200	1946	682 87	22,594	112·97	16 65	6,180 68	27,920	140	1597 88	740 8	1486 55	726 23	9,961 46	49 78	3078 68	6,882 74	34 48	1041 40	559 40
1855	210	1828	1041 49	25,766	122·70	14 25	10,003 38	30,634	146	2107 12	3126 44	4686 37	3451 10	17,513 74	83 38	3579 90	13,934 54	66 34	5709 90	2733 39
1860	216	2323	1213 6	35,534	164·51	13 66	15,220 64	39,446	182	3578 32	1617 50	4038 33	2090 0	23,577 89	109 15	4127 40	19,450 59	90 5	5029 90	1222 68
1865	219	2382	1242 18	34,974	157·7	14 46	16,623 41	46,291	211	4010 9	4337 48	5901 89	3256 8	28,859 5	131 75	4779 7	24,079 94	109 91	8536 48	2274 60
2. Gjedsergaard Dairy.																				
1865	108	2424	240 74	18,778	174·	13 92	8,938 23	22,788	211	1919 19	1882 43	3047 82	1330 30	14,698 19	136 9	2278 5	12,420 14	115 0	4263 44	1419 76

Cows Calved.		October.	November.		December.		January.		February.		March.		April.		May.		June.	
Year.	Cows.	Pots per Cow.	Cows.	Pots per Cow.	Cows.	Pots per Cow.	Cows.	Pots per Cow.	Cows.	Pots per Cow.	Cows.	Pots per Cow.	Cows.	Pots per Cow.	Cows.	Pots par Cow.	Cows.	Pots per Cow.
1861	2	2,116	6	1,699	70	2,672	46	2,719	19	2,443	34	2,698	17	2,317	10	1,913	4	1,962
1862	2	1,908	10	2,006	55	2,647	47	2,762	29	2,518	38	2,330	14	2,540	5	2,069	5	1,846
1863	1	2,825	7	2,165	69	3,061	63	2,825	18	2,629	32	2,431	7	2,262	6	2,627	3	3,300
1864	5	1,879	1	2,858	73	2,786	57	3,175	29	2,822	30	2,559	9	2,646	3	2,857	2	3,045
1865	2	2,690	1	3,509	53	3,348	63	3,220	13	2,905	26	2,752	19	2,528	13	2,161	13	2,329
	Cows Calved	Milk per Cow.															Cows Calved	Milk per Cow.

never take the management of any other dairy unless she had the comfort and protection of a similar arrangement. From that day the success of Messrs. Friis and Segelcke's 'Dairy Register' was assured, and it is now finding its way into all the best dairies of the country. In our ordinary manufacturing establishments, even where there are none of those elements of disturbance which always exist more or less where primary organic substances are manipulated, as in butter and cheese making, such analyses of results are sought for and valued. Would it not be well, then, for us to introduce them (in a modified form, perhaps, suited to our different requirements) into our own dairies, where too commonly practices are quite independent of principles, where figures are eschewed, and the "reign of law" all but unknown.

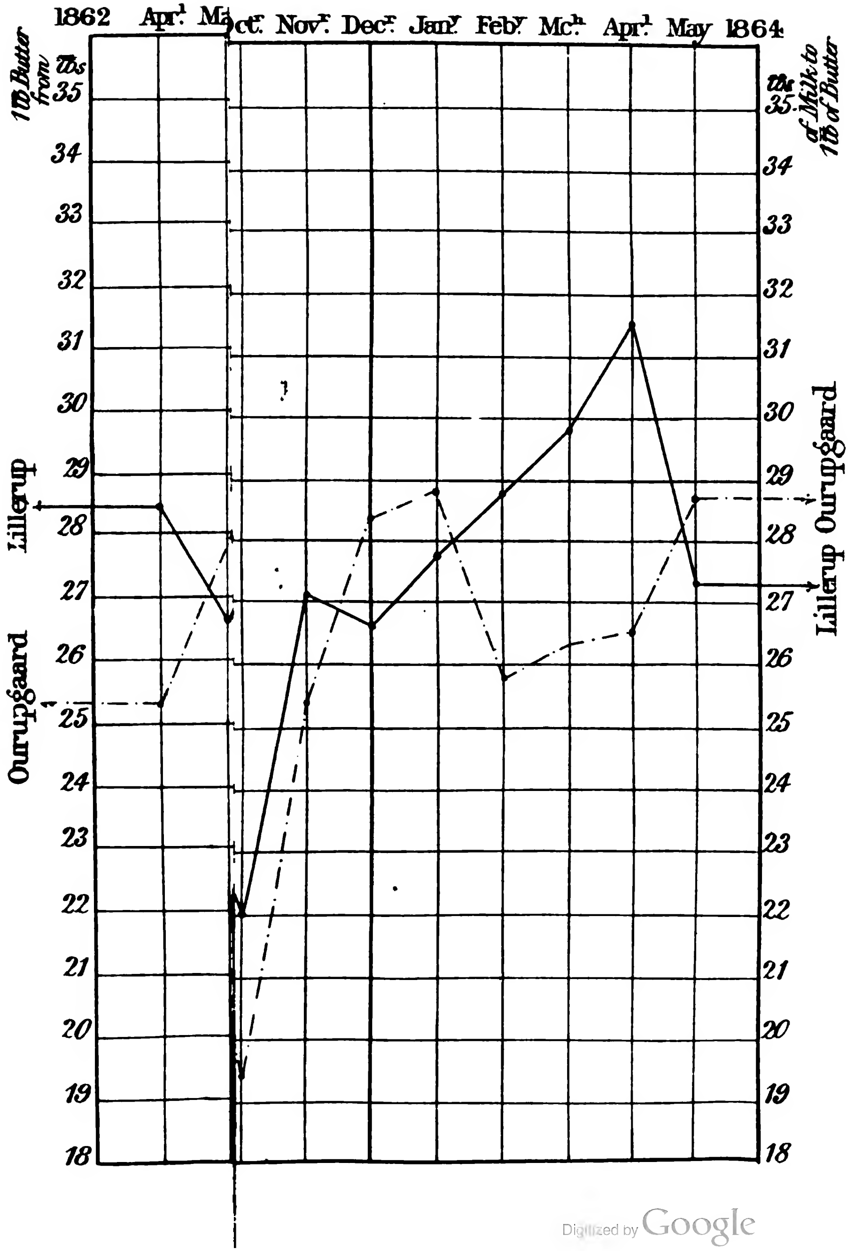
The cows are milked for about ten months after calving; the milking takes place twice a-day, at about 4·30 A.M. and 4·30 P.M. The calves are sold as soon as dropped, at an average price of 2 r.d. each; a few of the best bred being retained to keep up the stock.

In the winter, the milk is allowed to stand from 24 to 26 hours, it is then skimmed, and the butter made from the cream. In the summer, the milk is churned fresh, and always gives a better return both in regard to quantity and flavour of butter than when made from cream. It is usually tubbed at from 18 to 24 hours after it is made. Cheese is made from both the skimmed and the churned milk, the refuse portion being conveyed to the hog-pens. It is generally made twice a-day in summer, and once in winter; and in winter, both the cheese and the butter are coloured with annatto. The cream or milk for churning is generally set at 56° to 57° Fahrenheit in summer, and at 61° to 62° Fahrenheit in winter; the increase in temperature during the operation is about 4° in summer, and from 2° to 3° in the winter.

The quality as well as the quantity of the milk is a matter of consideration to the farmer. In Mr. Tesdorpf's returns (p. 314) is shown the practical bearing of the latter in the classification of the cows according to their respective yields. The tabulated returns of the Lillerup and Ourupgaard dairies during a continuous period of 26 months, as recorded in the accompanying diagram, show the variation in the quality of the milk at different periods of the year, and also the proportion of milk required for each pound of butter produced.

Until within the last few years, the dairy management in Denmark was much the same as it existed a century ago. The whole subject, however, in its theoretic as well as practical bearings, has recently been submitted to the test of experimental inquiry, which has rescued it to a great extent from the darkness

Months of the Year
Ourupgaard (Falster)
nclusive



and uncertainty attending its operations. Foremost in this good service were Mr. Friis and Mr. Segelcke,—the former testing and proving practically at Lillerup the value of the principles laid down and explained by his friend and fellow-worker. Thanks to these enlightened men, the thermometer has now the post of honour assigned to it in the dairy; for the dairy farmer knows well the important bearing it has upon his breeches pocket. In a pamphlet recently published by Mr. Segelcke,* on the 'Theory and Practice of Dairy Husbandry,' it is shown that—

1. The quantity of butter obtained by churning is dependent on the temperatures used.
2. The temperature that gives the best result differs according to the quality of the cream (more or less old).
3. At any temperature, higher or lower, the proportion of butter obtained is diminished.
4. A considerable percentage of butter, which otherwise might be obtained, is lost when the churning is not so regulated. This loss may often be very large, as a difference of only 2° Fahr. may result in a loss equal to 4 per cent., whereas where the thermometer is not regularly used, the temperatures frequently vary to the extent of several degrees.

The quality is also directly affected by the temperature at which the cream or milk is set, and its increase during the operation of churning.

The following results of experiments carried out at Lillerup show practically the bearing that attention to temperature has upon the produce obtained (see p. 318).

The results of each of these four double trials showed that a less proportion of butter was produced from the milk or cream when the temperature at the end of the churning was 63° than when it was 60½°; thus the difference of a single degree (Réaumur)† was sufficient to affect the butter-yield to the amount of from 4 to 5 per cent.

The average produce of butter obtained may be taken at 1 lb. of butter to about 30 lbs. of milk. In dairies such as those of Lillerup, Gjeddesdals, and Ourupgaard, and others under like management, the proportion is more satisfactory.

The importance of duly registering the daily produce of the dairy, and thus establishing a system of comparison and checks in each department, was too obvious to need much persuasion to

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* 'Meddelelfer vedrörende Meierivösenet,' &c., &c. Kjöbenhavn, 1865.

† The temperatures are all registered in Denmark according to the Réaumur scale, which bears the proportion of 4 to 9 to Fahrenheit, between the freezing and boiling points.

INFLUENCE OF TEMPERATURE ON CHURNING (Lillerup).

Sets of Double Experiments.	Temperature in degrees Fahrenheit at		Quantity Churned in lbs.		Butter produce in lbs.	For 1 lb. of Butter there was required.		Time occupied in Churning.	Therefore 1 lb. of Cream gave the same results as 5¾ lbs. of Sweet Milk.*	
	Commencement.	End.	Milk.	Cream.		Milk.	Cream.		Sweet Milk used to 1 lb. of Butter.	Percentage proportion of Butter obtained.
								Min.		
1	55¾	60½	284·90	35·10	22	12·95	1·60	105	21·75	100
	60½	63	306·72	37·28	22	13·94	1·69	43	23·24	93·6
2	56¾	60½	333·36	31·37	24½	13·20	1·28	105	20·24	100
	60½	63	321·59	31·18	23½	13·68	1·33	39	21·00	96·4
3	56	60½	343·17	22·36	21¼	16·15	1·05	104	21·92	100
	60½	63	347·32	22·63	21	16·54	1·08	68	22·48	97·5
4	56⅙	60½	340·94	22·53	20¾	16·43	1·09	113	22·42	100
	60½	63	340·56	22·47	20	17·03	1·12	45	23·19	96·7

insure its adoption as soon as a form of register was devised that should comprise all the points on which information was desired. The two forms of register† given at the conclusion, the one for daily entries, the other giving the monthly summary, were arranged by Messrs. Segelcke and Friis; the returns already given of Mr. Tesdorpf's dairy operations show how efficiently they fulfil their intended object.

The dairy working arrangements are generally good. The churns are necessarily of large capacities, generally in wood, and worked either by horse or steam power. At Valbygaard, near Slagelse, a new dairy has recently been erected, in which the shallow rectangular pans or trays in enamelled iron that received so much notice at the Great Exhibition in 1862, are used to contain the milk. There are 48 of these pans, each 9 × 3 feet, arranged in six rows of eight each. The cream is readily and rapidly removed from the surface by means of a light wooden rake carried upon two small wheels, which, travelling on the parallel side edges of the pans or trays, enables the rake to sweep over their entire surface. The dip of the rake into the pan is regulated by a simple mode of adjustment. When all the cream is removed the end of the trays is slightly tilted so as to discharge the skimmed milk into an open trough at the other end, which

* This proportion is the mean of a series of trials undertaken at the same time as the churning experiments.

† These are printed and published by P. G. Philipson, Copenhagen.

conveys it direct to the cheese tubs, whence it passes out in the shape of whey to the piggeries. The dairy herd on the farm consists of 170 cows.

A comparison between the dairy management and produce of our own country with that of Denmark would be valuable to both countries, if the data of both were equally reliable. But unfortunately this could not be insured, as, with a few exceptions, we are not in possession of any dairy statistics that we could offer for comparison, and even those are too limited in their details to justify a verdict on either side. The following returns from our own dairy records, however, may interest the Danish farmers, and perhaps induce a more general attention to selection and care in breeding, as adopted by Mr. Tesdorpf, and perhaps also the introduction of foreign blood, possessing milking properties, to cross with the best of their own. These returns are, no doubt, to be relied upon, as far as they go,—still they must be only taken for what they are worth—the milk produce of certain dairies on a comparatively limited scale.

Our principal dairy breeds are the Ayrshire, the Channel Islands, the Shorthorns, the Suffolk, and the Kerry. Some published returns of two dairies of Ayrshire cows give the annual milk produce per cow at 650 and 632 gallons respectively. Three returns of dairies consisting wholly of Shorthorns show a produce of 540 gallons, 630 gallons, and 765 gallons respectively, or an average of 625 gallons per annum for each cow. In two dairies where half-bred Shorthorns were kept, the yield was 810 and 866 gallons respectively for each cow. In four dairies in Ireland where pure Kerrys and crosses with Shorthorns and Ayrshires were kept, the annual produce per cow was returned at 500 gallons, 600 gallons, 675 gallons, and 740 gallons, respectively; or an average, on the four dairies, of 630 gallons per annum for each cow. A dairy of "pure Kerrys" * gave an average of 488 gallons per cow, and another of the larger Irish breed gave an average of 583 gallons per head per annum. In the great London dairies these returns are greatly exceeded. The cows kept are large-framed Shorthorn and Yorkshire crosses, which by good feeding bring the returns up to nearly 1000 gallons per annum for each cow kept. The custom in these establishments is to dispose of a cow directly her milk falls below two gallons a day, and buy another in her place.

The following milk return of one of our best managed dairy-farms (Frocester Court) shows the relative produce of cows in the successive years of their milking. The first lot were bought in at two years old; all the others at three years.

* A remarkably small native Irish breed.

No. of Cows.	Year of Milk.	Produce per Head.
8	1st	317 galls.
15	1st	472 „
14	2nd	535 „
15	3rd	616 „
20	4th	665 „
18	5th	635 „
9	6th	708 „
15	Old	651 „

The maximum reliable milk produce that we have recorded was that of a single cow belonging to the keeper of the gaol at Lewes, the details of which were authenticated by the Board of Agriculture. In eight consecutive years she gave 9720 gallons, or at the rate of more than 1210 gallons per annum. In one year she milked 328 days, and gave 1230 gallons, which yielded 540 lbs. of butter, or at the rate of 1 lb. of butter to 22 lbs. of milk. In the early part of the year 1866 a return was published of the produce of a cow in a Vermont (U. S.) dairy, which was stated to have given, in the previous year, a butter-yield of 504 lbs., at the rate of 1 lb. of butter to 20 lbs. of milk.

Quite recently too our Agricultural Journals have recorded the butter-produce of an Ayrshire cow at 399½ lbs., in the ten months between calving (March 10, 1866, and January 10, 1867), besides supplying the family with milk and cream; and of another cow of the same breed which has supplied the owner's family with milk and cream, and given for the three years, 1864-5 and 6, respectively, 269 lbs., 282½ lbs., and 274½ lbs. of butter.

The proportion of butter varies with the season and with the breed of the dairy cows: the milk of the Ayrshire cow is generally richer in butter than that of the Shorthorn or Suffolk, but this again is not so rich as that of the Kerry or Channel Islands breed. As a rule it has been found that the best returns have been obtained in the later summer or early autumn months, when we have returns of 1 lb. of butter to 20 lbs. of milk (Ayrshire breed); 1 to 19 (breed not stated); 1 to 19½ (Irish breed); 1 to 18½ (Ayrshire); 1 to 17½ (Ayrshire); 1 to 16½ (pure Kerry); and even 1 to 16 (Shorthorn): this last, no doubt, was under exceptional conditions. In all probability the average butter-yield of our dairies is about 1 in 30, ranging between 25 to 35 lbs. of milk to 1 lb. of butter.

Edinburgh, December, 1866.

XXII.—*The Improvement of Waste Lands.* By D. Macrae.

It is remarkable that while Great Britain is sending forth her sons all over the face of the earth to replenish and subdue it, such large tracts at home are left uncultivated, though capital as well as labour are abundant, home markets unrivalled, and the privileges and blessings of home life unequalled. It is true that where such lands abound the climate is often exceptional, and though many spots are naturally fertile the larger proportion of them would not be worth much for arable cultivation. Many of these tracts, however, would make good grass land or woodland, and in this respect their hilly nature or their watery skies would not stand in the way of profitable outlay.

Fifteen years ago, I lived for a short time in one of the lead-mining districts of Northumberland, where, at a very high elevation, lands, which in their original state had been of very little value, were reclaimed mainly by the workpeople employed at the mines. In this district there are no large farms, and very little arable cultivation is carried on near the spot to which my remarks apply, but up and down the dale here and there the fell-sides are dotted with cottages, many of them with green meadow-fields attached. The lands in many places beyond the fences which inclose these fields yield little else than heather and coarse grass. The fields are chiefly in the occupation of lead-miners, who spend 40 hours weekly (including meal-times) in working underground; their hours of labour being comparatively short, they find it a healthy change, both morally and physically, to spend some of their leisure hours in cultivating the land. I believe that much of the grass land in the district has been thus reclaimed. In many instances the work has only been partially done, and much more is required to bring it into a high state of cultivation.

As the operation of reclaiming must have been pretty much the same throughout, I will refer to a few only of the fields at the greatest altitude, about 1600 or 1700 feet, which, as far as shelter is concerned, are most unfavourably situated; and especially to three meadows in the occupation of three miners, whose cottages (built with stones) stand most exposed.

One of these fields was reclaimed about fifty years ago; the others were not until ten years later. In their wild state they, like the land now adjoining on the higher side, grew heather with an admixture of very coarse grass. The soil is a good strong loam with a subsoil of sandy clay resting upon sandstone rock. The process of reclamation consisted in burning and pulling the heather, paring off and burning the turf, and spreading the ashes

thereof on the land. The draining, which was done with stones, only aimed at the removal of springs. The land was fenced principally with stone dykes. A good dressing of lime was applied, as much as from 5 to 10 cart-loads to the acre. Where peat-earth or any other good earth could be got conveniently, it was mixed with the lime to make a compost, and cowhouse-manure was afterwards used. I believe it is now generally considered preferable to use the lime by itself in the first instance, and in after top-dressings, where lime is applied, to mix suitable earth with it. The lands never were trenched, and, in consequence of the large quantity of stones underneath the surface, are unfit for the plough; but as grass was the object, attention was paid almost exclusively to the surface.

I saw a field being reclaimed by one of the workmen connected with the mines in the same district and in the same way as above stated, with this difference that the importance of thorough draining being better understood, the work was more thoroughly carried out than in days of old.

As the result of such operations, the lands yield fair crops of hay; while the unreclaimed lands adjoining are worth only from about 1*s.* 6*d.* to 2*s.* 6d. per acre, inclusive of their value for grouse shooting, although their soil for the most part appears to be as fertile as that of the meadow-lands in their natural state.

As crops of hay are annually taken off these fields, they are frequently manured with cowhouse-manure, lime, and compost. The quantity of manure is usually limited to the production of the miner's cow, calf, and pig; but in some instances that number is doubled, and in not a few, a galloway, useful for carting home the coals, peat, hay, &c., is added to the stock.

About 100 feet further down the same fell-side I saw a meadow of about three acres, trenched as well as drained, which had apparently been originally reclaimed in much the same way as the others; but, in trenching, large heaps of stones were raised out of the ground, and these were made available for the draining, for renewing the old stone dyke, and making a bridge over a small ravine. The drains, which were 18 feet apart and from 3 to 4 feet deep, were completed about the beginning of June, when the land got a moderate dressing of stable manure and was sown with turnips, which however produced only a light crop. The following spring the land was manured as in the previous year, and planted with potatoes, which promised very well, but being affected by the disease, not much more than half of the expected crop was realised.

This field has since been laid under grass, and now yields good crops of hay, though for a while it grew less than before it was trenched. This, however, is easily accounted for; as, in

trenching, much of the best of the land on the surface probably found its way to the bottom of the trench, and grass was sown before the new soil had been put into good condition.

The growth of cereal crops is out of the question in a climate where the rainfall is excessive (amounting even in 1864 to 43·26 inches), at an altitude of about 1360 feet, where the summer season is short, and harvest weather precarious. All improvements effected under such circumstances should be done mainly with the view of enhancing the pastoral capacity of the land; the more so because I am not aware that any arable rotation, consisting solely of green crops, has been adopted. To bring the land to a high state of cultivation a large proportion requires to be trenched; but, without incurring the heavy expenses thus involved, much might be done by draining, liming, and manuring, thereby destroying the heather and replacing it with grass.

With abundance of clay for making tiles and the very best of lime, the utmost facilities are afforded for such improvements.

In many cases, lands might be reclaimed and improved by granting allotments to the miners at nominal rents, on condition of such lands being put into good order in a manner agreed upon. In some instances it may be desirable for the proprietor to make some outlay for fencing and a supply of lime, for which he would naturally charge interest in the form of increased rent; but as a rule the proprietor should do as little as possible besides giving security for a low rent by a lease or agreement for a term of years.

I have little doubt but that many of the miners of this district would be glad of such an opportunity. Their work underground is not so exhausting as to prevent their settling to some real work above ground, and much might be effected by one hour's work daily for five days in the week, and five hours, or half a day, on Saturday—a holiday underground. The miner would in this work have the assistance of his family, and occupation of this sort would be likely to prove beneficial by employing and training up the younger members to habits of industry when not old enough to go out into the world or engage in the less healthy labours of the mine. Many of the tasks connected with grass land are but light, and the heavier work might be reserved for the Saturday. Occupations of this sort give the men something more than grooves, ore, lead washing and smelting, to talk and think about: in short, they become small farmers as well as miners, and, so far as my observations have gone, interest themselves wonderfully in the practice of agriculture; so that in intelligent management of their meadows and stock they compare favourably with professional farmers in some parts of the country.

Pursuits of this nature have a tendency to prevent intemperance,

raise the character of the man, and, followed in moderation, recruit the frame when exhausted by underground labour, whilst they furnish the most restorative diet—a liberal home-supply of pure unadulterated dairy produce.

Such possessions and occupations attach men to the locality in which their lot may be cast, and give them more settled dispositions with hearty contentment: whereas the man whose interests are limited to the wages he receives in the mine or the workshop is too often unsettled, and ready to listen to evil counsellers and the voice of the agitator. The owner of the mines in the district in question employs, I believe, over 2000 people; and among his large bodies of workmen I never heard of there being a strike save one, which took place about twenty years ago, and was limited to a part of the works only. Indeed, I have heard many of the men regret that such an occurrence ever took place; and I believe that, without strong provocation, the present generation will not take part in another.

It has been argued, that because miners in some localities neglect the cultivation of their gardens, they are not likely to pay any more attention to the cultivation of allotments. But why are the gardens neglected? Mainly, no doubt, because of the miner's migratory habits, but partly because the gardens are not of such importance as to engage his diligent attention. But this objection may be obviated by granting him an allotment of sufficient size to enable him to keep a cow, rear a calf, and keep a pig or two. Indeed, once let a man be the owner of such possessions, and his migratory habits will speedily be checked; his disposition will be more settled; he will become a better citizen; he will cultivate his allotment well, and be a much better gardener than before he had the occupation of other land. Allotments, however, should not be given to all comers indiscriminately, more especially on first introducing the system into a new district, but a selection of the best and most suitable men should be made. Gardens, as a matter of course, go with cottages, without any respect to the tastes and dispositions of the tenants. No wonder that many are poorly cultivated!

In mining operations a large quantity of timber is required: this has, in many cases, to be carted long distances, varying from 10 to 20 miles. Since, therefore, these waste lands are of considerable extent, much ground might be profitably planted.

At the present time there are some thriving plantations of larch, and of Scotch and spruce-fir; of hardwood trees, the sycamore is the most thriving. The plantations are at altitudes varying from 1000 to 1600 feet. Although the long interval between planting and realising the crop is a great hindrance to planting on a large scale, still many collateral advantages—such as the improve-

ment of climate and provision of shelter for cultivated lands—are speedily attained.

If this twofold object be kept in view, and the land be judiciously selected for planting, the benefit conferred on a hill-side farm by the shelter gained will more than compensate for the land taken. If, for instance, from a farm of 1000 acres,—worth a rental of 10*s*. per acre, or 500*l*.,—100 acres be thus taken for planting, at the end of ten years the cost of planting and rent lost, with interest thereon, will amount to 13*l*. per acre, or 1300*l*. in all: but the shelter henceforth afforded will probably give to the remaining 900 acres an increased value of 12*s*. per acre, or a total value of 540*l*. per annum, a sum which will pay a small interest on the outlay, besides extinguishing the rent on the land planted; the thinnings, at say twenty-five years' end, will produce about 3*l*. per acre, and reduce the charge to 10*l*. per acre; and the improved rent thenceforth will pay a fair interest on the charge, whilst the ulterior returns will be so much clear gain.

Even if this be an over-estimate, it can well stand being reduced, and may serve to indicate the nature of the benefits to be derived, and induce us to investigate, more exactly than has been done hitherto, the extent of the advantages of the shelter afforded by trees to cultivated lands in exposed situations.

In some places, however, trees will not grow sufficiently high in ten years to afford much shelter; but generally where this occurs, if the lands have been properly planted, it will be found that in their natural state they are not worth 10*s*. per acre: in which case a larger number of years than that above assumed would elapse before the estimated charge of 13*l*. per acre would be reached.

When in the North-West Highlands in the summer of 1865, I measured larch trees in a plantation on the estate of Ardintoul, which at the age of twenty years were from 40 to 45 feet high, and a large number of the trees in parts of the inclosure averaged about 35 feet. The soil is loose sandy loam resting upon a gravelly subsoil. The plantation rises from the seaside at an inclination of something like 45 degrees, and the place where I measured the trees is about 300 feet above the sea level and on the bare side of the hill.

The prospects of the timber trade may perhaps afford an additional inducement to plant part of our waste lands, since the demands made upon the natural forests of North America and also of Norway and Sweden are so large as to threaten ultimate exhaustion.

According to the published returns of timber entered for duty during the year ending 31st December, 1864, it appears that

3,466,532 loads of hewn, split, or sawn timber, were imported into the United Kingdom, viz. :—

	Loads.
Timber sawn or split	1,986,081
Ditto hewn	1,480,451
Total	3,466,532

The estimated real value of the timber imported is stated to be 11 millions, and the quantity is said to be so much as to be without a parallel in Custom-house records; the increase within the previous twelve years having been as much as 77 per cent. on sawn, and 60 per cent. on hewn timber. Indeed, notwithstanding that iron is so much substituted for timber, particularly in ship-building, our annual consumption appears to be on the increase, and as civilisation advances the demand will very likely continue to grow. How long the natural forests can supply the increasing demand upon them it may be difficult to determine; but should that supply begin to fall off a great impulse would be given to the timber market, and the day may come before very long, or at all events before plantations now being made have arrived at maturity.

But the improvement of hill lands implies, at least, the destruction of some of the heather and a consequent encroachment upon grouse-shooting grounds. It would be a pity to do anything calculated to deprive our aristocracy, and those who work hard at the desk in our busy towns, of the healthy recreation of grouse-shooting. Whether grouse or the rearing of stock is to predominate, will, in the long run, depend upon which is the most remunerative. But is there not room for both? Some of the lands, in consequence of their altitude or barrenness, are fit for nothing else but growing heather; and where improvements, such as those suggested, are carried so far as to encroach upon the grouse grounds, the plantations made, together with their influence on the climate, would favour an equivalent increase of other kinds of game. But before the heather is much encroached upon, there is room for a great deal to be done in the improvement of the existing grass land, much of which on the hill-side is in its present state of little value.

An impression seems to prevail that because hills cannot be ploughed, and made to grow corn, potatoes, and turnips, there is no resource but to leave them in a state of nature. All other things being equal, I have yet to learn that grass will not grow upon a hill-side as well as upon a plain, though, in the first instance, it may be necessary to bestow some pains on the preparation and cultivation of the soil. If the same efforts had been made to increase the production of our pasturage as

have been expended on our corn-growing lands, would they not have been rewarded by equally good results?

I have hitherto spoken of such improvements as the miner, with little aid from his landlord, may accomplish; but to obtain a thoroughly good state of cultivation, the land in most places must be trenched, and this involves a large outlay. Much, however, of the waste lands south of the Scottish Border affords a much better subject to work upon, and the work itself could be done much more cheaply than that in the north of Scotland, to which I am about to refer. On the estate of Ardross, in Ross-shire, thousands of acres of waste lands have recently been reclaimed, nearly all of which have been trenched. I will give an outline of these improvements as an example worthy of being followed in England; and if it cannot be said that in all cases they are remunerative, yet owing to the difference of climate a better return from similar work may be calculated upon.

The estate of Ardross, the property of Alexander Matheson, Esq., M.P., is situated in the county of Ross, about 10 or 11 miles north-east of Dingwall, and stretches across from the shore of the Frith of Cromarty to the confines of Dornoch Frith, near Bonar Bridge, a distance of about 20 miles.

Ardross proper is almost surrounded by hills, and would have formed one large "corry" or concave opening between hills, with the lake of Achanacloich in the east, and the river Alness running through the west from north to south, had it not been that there are two hills in the centre which divide it into two, or perhaps I might say three, valleys or straths.

These hills, though of considerable elevation, exhibit the conical shape of the Northumberland fells rather than the precipitous form so peculiar to North Britain, and, with few exceptions, are not too steep for agricultural operations.

The climate is moist. The fall of rain during the year 1864 was 35·34 inches at an altitude of 450 feet. The season of harvest is generally about the middle of September; wheat is largely cultivated, and also barley, but oats are the predominant grain crop. The number of tenants before the improvements commenced was nineteen; the sheep-walk, including the arable farms of Gledfield and the two Fearns, being then in the proprietor's hands. Eighteen of these tenants had farms varying from six to twenty acres, consisting chiefly of shapeless, half-cultivated patches or crofts; the one remaining farm of Easter Ardross, which was well cultivated, being reputed to comprise about 400 acres. But the quantity cultivated in any shape was a mere trifle compared with the vast uncultivated lands around, which for the most part were covered with heather, interspersed here and there with patches of coarse grass, bogs, and

marshes, or in other parts studded with immense boulder-stones, many of them more than 50 tons in weight. Some of these hill-sides are so closely clad with heather that there is scarcely a blade of grass to relieve the monotony of the scenery.

The extent of valuable plantations among which I do not include birch, alder, &c., was very limited. In what was then the most valuable part of the plantations there are now some good trees, viz., ash from 4 to 10½ feet in circumference, and oak from 7 to 9; one measuring 11½ feet in circumference.

The present proprietor in taking possession of his estate had to make his first temporary abode in a shooting-lodge, erected in the most central and convenient situation for proximity to the grouse grounds. There were only one or two good farm homesteads, and the farmhouse connected with the largest farm was so inadequate that a new one had to be erected.

The improvements commenced in earnest in the spring of 1847 by planting Knocknavie plantation, comprising over 400 acres, and as the ensuing summer approached the estate became alive with mechanics and labourers; the work of building, draining, trenching, dykeing, and road-making was commenced simultaneously; it was carried on with speed and regularity, rarely equalled in rural districts, for several years, and even lately was going on, although with abated activity.

A castle with all fitting accompaniments has been built on the site of the old shooting-lodge, on the top of the east bank of the river Alness, and the surrounding pleasure-grounds comprise between 700 and 800 acres, which are well stocked with trees and shrubs, and traversed by about 14 miles of walks from 5 to 6 feet wide. The river Alness runs through the pleasure-grounds, meeting from the east the Tolly burn and from the west the Lealty burn, whose deep and undulating banks embellish the landscape.

At the same time commenced the erection of farm buildings, the most important of which were provided with a thrashing-machine propelled by steam, water, or horse power. Neither were the wants or comforts of the smaller tenantry overlooked or set aside for a time, for the work of cottage-building commenced as early as that of the castle, and has been continued until an individual can hardly be found on the estate who is not provided with a comfortable residence.

The plantations, excepting those within or adjoining the pleasure-grounds, are chiefly made upon the higher grounds, at altitudes varying between 500 and 700 feet, and comprise over 4000 acres, which are divided into 16 or 17 inclosures; 4 of which contain between 400 and 500 acres each, 6 from 100 to 300, and the remainder less than 100 acres each. As the trees

were planted about 3 feet apart, over 19,300,000 plants must have been put in, of which about 15,000,000 were Scotch fir, 3,400,000 larch, and 900,000 oak, ash, elm, sycamore, spruce, &c. The average cost of planting was about 3*l.* 3*s.* per acre, viz.:—

	£.	*s.*	*d.*
Fencing	1	3	0
Draining	0	4	0
Plants (4,840)	1	5	0
Planting	0	11	0
	£3	3	0

The low cost of planting is to be accounted for, in the first place, by the plantations having been made in large masses. In the next place, the Scotch fir and larch plants put in were very young,—the larch being chiefly 1 year seedlings, 1 year transplanted, and the Scotch fir 2 years seedlings, 1 year transplanted, which cost from 3*s.* 6*d.* to 5*s.* per 1000; and the cost of planting such young trees being much less than if they had been a year or two older, inasmuch as no pits were required. They were planted by making a deep slit in the shape of a T, into which the plant was inserted, and then the ground was pressed down by the planter's feet. The workmen chopped the heather with their spades around the spots where the plants were put in; thus giving the plants an opportunity of getting the lead of their next neighbours, while they were sheltered by that left growing between them. Where vegetation is very rank it is always necessary to plant larger trees.

The common spade was the tool used for planting; the workmen generally preferring spades well worn down to new ones. The men had all small canvas bags, about 16 inches long and 9 inches deep, tied round their waists to keep the plants in (say from 30 to 50 at a time, according to size), and the planter, after making the slit aforesaid with the right hand, bent down the spade-handle towards the ground, thereby opening the slit, and with his left hand he took a plant out of his bag and inserted it into the slit, and then completed the operation by pressing it gently with his feet.

The planting was always done by men, but a few boys were employed in carrying the plants from where the carts left them and serving them to the men as their bags got empty. The men were in line, 3 to 4 yards apart, that space enabling them to work freely, and one of the best men was selected for each end of the beat.

The hardwood trees were planted in pits, the opening of which cost about 1*s.* per 100, and, in filling in, the best of the earth

was always put nearest the roots, and the earth being filled in it was gently trampled, and then the sod, being divided into two halves, was laid on the top with the grass side under. The oak plants, $3\frac{1}{2}$ feet high, cost 24*s.* per 1000; the elm, sycamore, beech, &c., 18*s.*; and the spruce, 8*s.* 6*d.* per 1000. The men were paid from 10*s.* to 12*s.* per week, the latter sum being that most generally given to good hands. As the plantations were on dry situations, on the tops of hills or on hill-sides, but little draining was necessary. It was done by open ditches about 18 or 20 inches deep, at a cost varying between 1*s.* 3*d.* and 3*s.* per chain.

The plantations are fenced chiefly with turf dykes, which cost, including clearing the foundation, from 2*s.* 9*d.* to 3*s.* 8*d.* per rod. When made on flat ground or up and down hill-sides they are made 6 feet wide at the foundation, 6 feet high in the front, and 2 feet wide at the top. The front is kept as nearly perpendicular as possible, whilst at the back there is a regular slant from the bottom to the top. When the dyke runs across the face of a hill it is easily made, the principal operation required being clearing the foundation and building the front. In that case the back consists partly of the hill-side and partly of the loose earth removed in clearing the foundation. In all cases the face of the dyke should consist of the best turf regularly laid with the grass side under, in much the same way as the bricklayer or mason places such materials as bricks or stones. These fences have answered the purpose fairly; they stand well during the first few years, but in course of time settle down, so that a light beast would not have much difficulty in getting over them; if however they have sufficed till the trees are grown large enough for making rails by running one or two rails along the tops of the dykes, very efficient fences are obtained at a moderate cost, or even if such rails are not produced when required, a good fence capable of resisting the most agile of mountain sheep is made by running wires along the top.

I will now refer more particularly to the growth of four of these plantations, occupying situations of different character, three of which I assisted in planting.

Knocknavie Plantation, comprising about 420 acres, stands at an elevation of about four or five hundred feet, and is formed on the north-west side of a hill of the same name. The soil is light gravel. It was planted in the spring of 1847 with Scotch fir, larch, some spruce, and a limited number of hard-wood trees, chiefly oak. In 1865 the larch and Scotch firs in the best parts had attained to a height of from 10 to 20 feet, in

others they did not average 10 feet, whilst again in other parts the ground has been disafforested, and is now under arable cultivation.

This land formerly produced a natural crop of Scotch fir, which was cut down in 1843; in 1847 it was replanted, but without any preparation of the ground either by grubbing or trenching. Indeed there was not even a proper change of crop, for the last planting consisted chiefly of Scotch fir, a circumstance no doubt well accounting for the crop having to a large extent failed.

Schoolhouse Plantation stands at an elevation of about 500 feet, and occupies the sides of a small ravine. The soil is strong loam. It was planted in the spring of 1847 with oak, ash, sycamore, elm, &c., together with larch, spruce, and Scotch fir, to act as nurses. This plantation has made remarkable progress; in 1865 the hardwood trees were from 20 to 25 feet high.

Knockdhu Plantation, which comprises about 58 acres, stands at an altitude of about 700 feet, and is formed round the crown of a conical-shaped hill. The soil round the base is a strong loam, but towards the top it is thin and very poor. It was planted in 1848 with Scotch fir and larch. The trees round the base of the hill in 1865 ran from 15 to 25 feet high, decreasing in size towards the summit, which is very much exposed.

Brackra Plantation, which is formed on an inclined plane, stands at an elevation of about 500 feet, and comprises about 273 acres. The soil is strong loam. It was planted in 1849 with Scotch fir and larch. Many of the trees in 1865 ran from 20 to 25 feet high.

The ground occupied by all the plantations here referred to, with the exception of the Schoolhouse, had been more or less covered with heather before the plantations were made; and before the plants were put in, there was no preparation of the ground beyond making the necessary surface drains and clearing away the underwood and rubbish.

Why so large a proportion of Scotch fir was planted, more particularly as much of the land is well adapted for growing hardwood, I cannot explain, unless it is to be attributed to the fact of my countrymen being somewhat prepossessed in favour of their native fir. At all events it has not increased the beauty of the Woodlands; on the contrary, it gives them a rather dull appearance.

The work of reclaiming the waste lands consisted in draining and trenching; the land being trenched to the depth of between 16 and 18 inches. The drains were cut at various distances apart, but generally within 40 feet. The leading drains were cut 4 and 5 feet deep, and the minor ones between 3 and 4 feet deep. The

question whether stone or tiles should have the preference in draining was settled by the materials at hand, for the stones encumbered the ground. The quantity of land reclaimed and improved amounts to over 5300 acres.

The work of reclamation was for the most part done by piece-work, the men generally working in small companies of from 2 to 6. The lands are fenced with double stone dykes, stone face dykes and wires. The double stone dyke, 5 feet high, cost 8*s.* 3*d.* per rod, and the stone face dyke 7*s.* 4*d.* per rod. The wire fences, consisting of 7 wires on iron straining posts, 1½ inches square and 70 yards apart, with larch posts between, cost about 7*s.* 2*d.* per rod, or when used along the roads with nothing but iron posts and with iron stays at the curves, they cost about 11*s.* per rod.

I will now refer to a part of the land situated at an altitude of about 500 feet, which was laid down as permanent pasture after being reclaimed. The soil consists of a good strong loam, with clayey subsoil resting upon sandstone. After the operations of trenching, draining, fencing, &c., were completed, the various fields were cultivated very much in the same way as the examples given below.

Field No. 1, after being trenched and limed, was in the following year heavily manured with compost, consisting of moss and sewage. It was then sown with wheat and seeds for permanent pasture. The yield of wheat was 5 qrs. per acre, weighing 64½ lbs. per bushel.

No. 2 was trenched and limed. The following year it was manured with vegetable matter taken out of dried ponds, mixed with ashes, and sown with turnips, which were eaten off by sheep. The following year it was sown with oats and seeds for permanent pasture. The yield of oats was 6 qrs. and 2 bushels per acre, at a weight per bushel of 44 lbs.

No. 3 was trenched and limed, and in the following year manured with 3 cwts. Peruvian Guano per acre, and sown with oats, the yield of which averaged 6 qrs. to the acre. The next year it was manured with about 28 cubic yards of farm-yard manure and 3 cwts. Guano, and sown with turnips, the yield being as nearly as could be estimated 25 tons to the acre. The following year it was sown with barley and seeds for permanent pasture, when the yield of barley was 5 qrs. and 6 bushels per acre.

No. 4 was trenched and limed, and the following year it was sown with oats and seeds for permanent pasture: it was wholly manured with matter taken out of drained ponds. The yield was 6½ qrs. to the acre, at a weight of 43 lbs. to the bushel.

This part of the reclaimed lands, consisting of 160 acres, was

for some time let annually as grass parks by public auction, when some realised as much as 5*l.* per acre, and the average for a series of 5 years is reported to have been 3*l.* 8*s.* 8*d.* per acre.

Such a rent as 5*l.* per acre for grass land is not unusual in the neighbourhood of London or other large towns in England; but at Ardross (20 or 30 miles from the nearest large town), for lands which for ages had been allowed to remain in an unproductive state, it is remarkable. The cost of trenching, draining, and clearing was about 22*l.* 14*s.* 3*d.* per acre, viz.:—

	£.	*s.*	*d.*
Trenching	8	13	0
Draining	6	11	0
Blasting	5	2	0
Clearing	2	8	3
	£22	14	3

There were besides, the expenses of fencing, but these, as well as the cost of draining, were kept down by large quantities of stones raised in the trenched ground being made available for these purposes. But, on the other hand, great was the cost of trenching, clearing, and blasting—a term suggestive of the large numbers of boulder stones, with which the lands abounded, and which could be removed by means of gunpowder only—I believe it is no exaggeration to state that the blasting alone of some parts cost above 10*l.* per acre.

For much of the foregoing particulars of the cost of the different works, and also the statement respecting the grass-lands, I am indebted to a report of the superintendent of the works, published by the Highland Society. I have not been successful in obtaining similar information respecting the arable lands, but I am able to state that they are let at rents varying between 12*s.* and 35*s.* per acre, and they are cultivated upon the five-course rotation, viz: oats, turnips or potatoes, barley or wheat, and two years' grass.

The sum given above as the cost of reclaiming the land is not to be considered as an average for the whole work; the average would probably be a good deal in excess of the amount stated.

In common with the other improvements, upwards of 40 miles of excellent roads have been made, generally 14 feet wide; for bottoming these, good materials were at hand in the stones which were cleared off the trenched land.

The work carried on at Ardross has been no mere nibbling, nor can it be called an encroachment on a large scale upon the margin of a vast extent of uncultivated lands. It has been more like going into the heart of an enemy's territory and taking his citadel by storm. Imagine for a moment a shooting lodge so closely surrounded with the heather grounds that the sportsmen might well

have had opportunities of bagging at least stray birds from its front door—imagine not only that building converted into a first-class residence, but the adjoining lands metamorphosed into a suitable demesne. To effect this thoroughly much land had to be reclaimed at a cost which for purely agricultural purposes could not be remunerative. Besides, some of the lands in the neighbourhood of the Castle lands, on other parts of the estate, do not pay a fair percentage upon the cost of reclamation. In fact, the work has gone on where unquestionably it would never have been undertaken without the further object of contributing to the enjoyment of the proprietor and his tenants.

It is well known, at all events in the neighbourhood, that Mr. Matheson has taken a very great interest in promoting the comfort and happiness of all his tenantry, and of none more so than the small holders. To enlarge and improve their occupations, the lands had in some instances to be reclaimed at a large cost, and were then let on easy terms. As sheep-walks the lands so reclaimed would have paid better; as it is, they contribute to the enjoyment of the owner and his tenants, and to the wealth of the nation.

In taking a ramble along the boundary-line between the cultivated and uncultivated lands on an autumnal day, the contrast on either hand is very striking; for whilst a dry stone dyke separates heather tall enough to reach the knee from the beautifully green turnip-fields and the undulating yellow corn, the lands lower down, which were but recently in a state of comparative barrenness, are heavily stocked with sheep and cattle.

28, *Hungerford Road, Camden Road,*
London, N.

XXIII.—*Annual Chemical Report.* Presented to the Council by Dr. Augustus Voelcker.

At the request of the Chemical Committee I have carried out, during the past season, as in former years, a series of field-experiments, having special reference to the manuring agents best suited to promote the growth of clover-seeds, and to the most profitable application of such manures to permanent pasture.

The same manuring agents as used in the three preceding years were again had recourse to in 1867, but applied in various parts of the country to land differing in character.

I have now to report on the successful employment of potash in promoting the growth of clover, more especially as in many of my former field-trials, recorded in the Society's Journal, the

artificial application of potash-manures did not yield results warranting the recommendation of such manures to the practical agriculturist; for even under conditions in which a beneficial effect was thereby produced, the results were not sufficiently marked to prove the economical advantage of laying out money in the purchase of potash-salts. During the past season, however, I have obtained for the first time results showing in a most decided manner the practical utility of employing potash-salts as a fertilising agent in producing a luxuriant growth of clover and clover-seeds.

The experiments to which I would direct particular attention were tried under my superintendence by Mr. John Coleman, on Lord Wenlock's home farm, at Escrick Park, near York. The experimental field was of a poor sandy character, and the piece selected as nearly as possible even, as regards the quality of both the land and the grasses. The grass and clover-seeds were sown the preceding year with a barley crop. The following manures were applied on the 11th April, and the first cutting was reaped on the 12th of June and the second on the 24th of August, each plot being carefully weighed on the same day as cut:—

Plot.
1. Nitrate of soda, at the rate of 4 cwts. per acre.
2. Sulphate of ammonia „ „
3. Mineral superphosphate „ „
4. Common salt „ „
5. No manure.
6. Muriate of potash „ „
7. Sulphate of potash „ „
8. Sulphate of lime „ ton per acre.
9. Mineral superphosphate and nitrate of soda, at the rate of 4 cwts. per acre each.
10. Mineral superphosphate and muriate of potash, the rate of 4 cwts. per acre each.
11. No manure.

No change was visible until about the 23rd of April, when plots No. 1 (nitrate of soda) and No. 9 (mineral superphosphate and nitrate of soda) could be distinctly distinguished from all the others by their darker green colour and grosser growth, which was apparent until the crops were cut.

The nitrate of soda, however, encouraged the growth of the Italian rye-grass to such an extent that the clover was for the greater part quite smothered, and the clover so choked that when I saw the field afterwards, at the end of last October, hardly a single plant of clover was visible on the plots to which the nitrate was applied in spring. On the other hand, the clover which grew very luxuriantly on plots 6 and 7, dressed with muriate and sulphate of potash respectively, grew still more luxuriantly on plot 10, dressed with mineral superphosphate and

muriate of potash. The clover and rye-grass on plot 10 were both long, strong, and of excellent quality; the clover especially being distinguished by luxuriant broad leaves and a dark green colour. On the whole, plot 10 yielded by far the best crop both as regards quality and quantity.

The undressed plot yielded, in round numbers, 5½ tons of green food in the first cutting, and nearly 2 tons in the second. Muriate of potash, applied alone at the rate of 4 cwts. per acre, produced, in round numbers, 6½ tons of green clover-seeds in the first cutting and 3½ tons in the second, or both cuttings gave an increase of 2½ tons of superior quality; whilst mineral superphosphate and muriate of potash mixed together yielded 9 tons in the first and nearly 5 tons in the second cutting, thus producing altogether an increase of 6½ tons, or nearly double the amount of green clover-seeds grown on the unmanured plot. This large increase, it should be observed, was not produced at the expense of quality, for, as noticed already, the crop on plot 10 was by far the best in quality of all the 10 plots, and up to the present day the clover stands well here, whilst on most of the other plots it is either less luxuriant or has in a great measure disappeared.

Nitrate of soda alone produced, in round numbers, 8½ tons in the first cutting and only 2 tons in the second.

This result is particularly interesting, inasmuch as it showed that whilst this saline manure yielded a considerable increase in the first cutting it left the land in a more exhausted condition than land which has not been dressed with this special manure, for the unmanured plot yielded 2½ tons in the second cutting, and that dressed with nitrate of soda only 2 tons.

Nitrate of soda thus appears to force an early growth of Italian rye-grass for which it seems more suitable than for clover, and is more useful when an early cutting is required, and the farmer intends to grow a large bulk of green food for the use of cow-keepers, instead of a good quality of grass and clover-seeds for hay.

On sandy soils in a poor condition nitrate of soda produces very coarse grass; the Italian rye-grass in the instance before us being little better than good oat-straw. On such soils nitrate of soda should not be used alone, for it has an unmistakeable tendency to exhaust the land.

Another interesting result to be found in these experiments was that mineral superphosphate applied by itself gave hardly any increase in either the first or the second cutting. This is all the more remarkable, because, in the same set of experiments tried in other parts of the country on soils not so light and sandy as that on Lord Wenlock's farm at Escrick, mineral superphosphate produced a marked increase in the clover crop, and because

the addition of muriate of potash to superphosphate, in the Escrick experiments, very materially raised the increase of the crop over that produced by muriate of potash alone.

We may learn from these experiments that a most useful fertilising agent like phosphate of lime may in some instances remain ineffective, because the soil to which the former has been applied is deficient in another equally essential plant-constituent, such as potash. The analysis of the soil from the experimental field, indeed, showed only traces of potash, and this no doubt is the reason why the artificial supply of muriate of potash, especially in conjunction with superphosphate, was attended with so remarkably good an effect, and also that the latter alone did not produce a good result.

Whilst I have to report favourably on the employment of a mixture of superphosphate and muriate of potash in the preceding experiments, and also in a similar experiment carried on last season in Berkshire, by Mr. Kimber, of Tubney Warren, Abingdon, I am bound to state, that in other experiments made last season, potash had little or no effect in raising the produce of the land. Indeed, my present experience leads me to think, that whilst potash-salts in conjunction with phosphates are very useful in the case of certain poor sandy soils, their special application to land in a good agricultural condition, or to soils containing an appreciable quantity of clay, does not appear to yield results commensurate with the price at which potash-salts can at present be bought.

I have only briefly alluded to the chief points of interest which I noticed in the field-experiments instituted by me in 1867, as I purpose giving a detailed account of them in a future volume of the Society's 'Journal.'

In the past season my attention was occupied with an investigation into the chemical composition of drainage-water proceeding from land continuously manured with ammoniacal and other nitrogenous manures, and from land left continuously unmanured or dressed with mineral fertilisers only; the materials for carrying on this investigation having been kindly placed at my disposal by Mr. Lawes. Drains were opened by his directions in the experimental field at Rothamsted, where wheat was grown for more than 25 years in succession with a variety of manures, both nitrogenous and mineral, and the drainage-water from eleven sections of the field was sent to me at various times throughout the year. The investigation which has already yielded very interesting results, having an intimate and important bearing on the exhaustion of land, and the physiological laws which govern the growth of plants, is still in progress, and likely to occupy my attention for the next two years, for it has opened up quite a mine of theoretical inquiry.

In conjunction with this subject I have begun a laboratory investigation of the nitrification which takes place in soils, especially after the cultivation of certain crops.

The number of analyses made for Members of the Society during the past season, as will be seen by the appended summary, was fully as large as in the preceding year; not less than thirty samples of water, and an unusually large number of limestones, marls, and other minerals having been received by me.

Six cases of supposed poisoning were referred to me, and mischief was reported to have been done in several instances by inferior oil-cakes. Mixed and adulterated oil-cakes, I am sorry to report, seem still to be more abundant in the market than good and pure cakes.

Decorticated American cotton-cake of good quality, notwithstanding the cecession of the American war, appears to be still a scarce article, for most of the samples sent to me for analysis were very old mouldy cakes, and some scarcely fit as food for cattle.

The average proportion of ammonia in genuine Peruvian guano within the last year or two has somewhat declined, and that of sand slightly increased. Genuine first-class Peruvian guano in 1867 probably contained on an average not much above 15 per cent. of ammonia.

Amongst the analyses of more general interest I may mention the following:—

Composition of Acorns.

Proportions of Husk and Kernel.

Husks	13·90
Kernels	86·10
	100·00

1 lb. of fresh acorns when bought were put aside, and weighed again on the 18th of November, before the analysis was made, when it was found that the weight was reduced to 13½ ounces.

The kernel when analysed was found to contain in 100 parts:—

Moisture	40·88
Fatty matters	2·64
*Albuminous compounds (flesh-forming matters)	4·39
Starch, gum and sugar, &c.	46·74
Woody fibre (cellulose)	3·94
Mineral matter (ash)	1·41
	100·00
* Containing nitrogen	·703

Acorns, which are much relished by sheep and pigs, are sold in ordinary seasons to farmers in Hertfordshire and elsewhere at

1*s*. 3*d*. to 1*s*. 6*d*. a bushel; a bushel weighing about ½ cwt. The proportion of flesh-forming or nitrogenous matters in them is very small, whilst that of starch and analogous fat-producing compounds, is large. Acorn kernels contain but a small quantity of indigestible woody fibre, and are excellent fattening food for sheep.

Their composition affords another proof of the fact that the economic value of food is much more dependent on the amount of available non-nitrogenous than on that of nitrogenous compounds contained therein.

Beef Powder.

A sample of dried and powdered beef, prepared in Queensland and sent to England in an ordinary flour-barrel, on analysis yielded:—

Moisture	7·48
*Nitrogenous (flesh-forming) matters	67·56
Fat, extractive matters, &c.	21·55
Mineral matters (ash)	3·41
	100·00
* Containing nitrogen	10·80

Composition of Feeding-meal sold in the neighbourhood of Reading at prices varying from 5l. to 6l. a ton.

A sample of such feeding meal on analysis was found to consist of:—

Moisture	3·77
Oil	1·19
*Albuminous compounds (flesh-forming matters)	1·62
Woody fibre (cellulose)	40·86
Oxides of iron and alumina	1·23
Carbonate of lime and a little magnesia, with traces of alkaline salts	44·93
Silica	6·40
	100·00
* Containing nitrogen	·26

A glance at the preceding results shows that this meal, which had the appearance of rice-meal, consists almost entirely of rice-husks ground fine, and chalk; the latter taking the place of the starch of good rice-meal.

It is scarcely necessary for me to say that such a mixture is worse than useless when given to animals in any quantity.

Composition of Feeding-meal recommended as Pig's Food.

Rice-meal when of good quality, in conjunction with other food, may be given with advantage to pigs; but rice-refuse meal

which is often sold as pig's food, if containing, like a sample recently analysed by me, scarcely any flour, and consisting mainly of the indigestible outer husk of rice ground down fine may endanger the health and life of the pigs fed upon it. This sample contained in 100 parts:—

Moisture	7·80
Oil	1·45
*Albuminous compounds (flesh-forming matters)	3·06
Starch or digestible fibre	21·77
Woody fibre (cellulose)	50·34
†Mineral matter (ash)	15·58
	100·00
* Containing nitrogen	·49
† Containing silica	13·58

This refuse although not quite so bad as the preceding artificial meal, is not much better as a feeding material than fine sawdust and ground flints.

Analyses made for Members of the Royal Agricultural Society, December, 1866, *to December,* 1867.

Guanos	30
Superphosphates and similar artificial manures ..	63
Nitrate of soda and sulphate of ammonia	16
Refuse manures	29
Bone-dust	11
Limestones, marls, and other minerals	53
Soils	18
Waters	30
Oilcakes	62
Feeding meals, and vegetable productions	19
Haymaker's small beer (clink)	4
Examinations for poison	6
	341

Laboratory, 11, *Salisbury-square, Fleet-street, E.C.*
March, 1868.

XXIV.—*Rise and Progress of the Leicester Breed of Sheep.* By Henry H. Dixon.

Prize Essay.

"Brave men lived before Agamemnon," and Leicestershire had good sheep before Bakewell's day. Two hundred years ago, "the husbandman's acre staff, and the shepherd's hook were in this county in state, and commanded manufactures to observe their distance from them." Its famous Rothley Plain was a rabbit-

warren and a sheep-walk as well, with public shepherds, who made an annual ewe and wether draft from the flocks. Writers of the period, who intermeddled but little with farming-stock in their essays and their lays, had a word to spare for its pastures, and "the height and goodnesse of its sheep;" and one of them had "credibly heard that neither Lemster nor Cotswould can exceed them, if one respect either largenesse of the bodie, finenesse of the wooll, or goodnesse of the breed."

They might have already acquired a name in this bean-growing shire, but still it is to Mr. Bakewell that they owe that improvement which has kept them to this day in the front-rank of the long wools. The late Mr. Creswell, of Ravenstone, was nearly the last of those who attended the ram sales at Dishley. He was there as a lad of fifteen, with his father; and not many months before his death,* he recounted to us with all the zest of youth, how he watched the hirers drawing cuts for choice with hay slips, or taking figured marbles out of a bag. There are pictures extant of the great breeder in his drab Quaker-cut coat, his jack-boots, and his periwig. Dine who might with him, he would not break through his rule of having a small round table to himself, in a corner near the window. Men of every degree were found at that too hospitable board, and Mr. Coke said with truth that "Dishley is the best inn on the road." Arthur Young tarried there in his pleasant pilgrimage with horse and saddle-bags to the Midlands, and studied his host right well. He told, among other recollections of his visit, how the ewes (which were never sold to breeders) were rotted before they went to the butcher, by putting them on pastures, over which, after May morning, water was always flowing.

Mr. Bakewell's black cob was as peculiar as himself. He always rode with a loose rein, and without whip and spur, and if it stopped, he only talked to it. Its tail was his peculiar care, and was duly nicked and supported for a time by india-rubber bands and pulleys, so as to attain the desired shape and elevation. Black cart-horses of the "Old K" sort were nearly as much his delight as long-horns and long-wools, but as the story went, when he received a summons to show one of them in London to George III., his Majesty looked much more at the man than the horse. His management of vicious animals was remarkably effective. A horse which was sent to him as irreclaimable, soon followed him like a dog up and down the Loughborough corn-market, and a bull which arrived at Dishley, under the escort of six cows and a man on horseback with a nine-foot spike, was reduced to submission by a system of starvation,

* In 18C6.

sleeplessness, and scratching at the tail-head, which was supposed to go on for three or four consecutive days and nights.

The memoirs of this old Leicestershire worthy have never been published, but his sayings, such as—"Money wears but three lives;" "Consume half the corn you grow with beasts, or lay out half its price in cake;" "Rise with the lark, and to bed with the lamb;" are still preserved with his essays in a MS. book at Dishley. The essays are short, but take a wide range—from Punctuality to Salt and Saliva. He dwells much on the necessity of having no water in the fields where the ewes are lambing, "on swimming home turnips, freight free to the grating," and on using leaves for manure. With him good cattle and sheep were a theme which never grew stale, and he insisted much on the necessity of "a barrel or an egg form." Ridgy backs and big bellies were his aversion, fulfilling as they did his favourite metaphor of a horse's collar put on the wrong side upwards. Against large bone, and carcases full of offal, and "head and pluck, a load for a man," he also waged vigorous war. There is a story that he improved his sheep from a black ewe on Leicester Forest, and some Cheviot men cherish a tradition that he bought from their forefathers; but on the origin of his flock he is perfectly silent. He does not even allude to what Pitt, in his 'Leicestershire Survey,' which was made before 1790, considered to be evidence of the purest blood, viz., the cloven back, and "the loose bit of flesh behind the shoulder, corresponding to the flank of a bullock."

Still the sheep lore in these papers is very rich and discursive. We are told more than once that the scrag or "collar" of a ram should be "thick and bowed like a swan, so that the drops from his nose may fall on his breast;" that he should have "an eye like a hawk, and a heel like a lark;" "the head long, and thin between the eyes, and the ears thin and free from wool." To ewe-headed rams Mr. Bakewell gave no quarter. He thought them invariably light in their lean flesh, and delicate in constitution. According to his creed "nothing but first-rate loins, thighs, and scrags can support in-and-in-breeding." Hence he never wearied of citing the maxim of an old farmer, who went to see a brindled cow, and placing his hand on the loin, spoke, like an oracle, as follows—"strong loin, strong constitution."

"The hogshead or truly circular firkin shape" with "short, light-boned legs, not much exceeding six inches in length," was his Improved Leicester sheep mould, "on the plain principle, that the value lies in the barrel and not in the legs." As regards size he put on record that Mr. Stubbins had a ram 2 ft. 7½ in. in height. One of his best Dishleys was 2½ in. less, but measured 5 ft. 10 in. round the heart, 1 ft. 9½ in. across the

hips, and 16 in. round the scrag. Of the Lincolns he does not speak very charitably, and as merely the fact and not the result of his competition with Mr. Chaplin's gimmers is mentioned, it would seem that the battle was against him. Upon his authority the Lincolns of that day contained a barrowful of garbage, did not feed till they were three-shears, and then ate more than an ox. In "Mr. Tindal's great Lincoln, which weighed 67 lbs. a quarter," he deigned to claim his part, but the flockmasters—

> "Where Lincoln's bell,
> Flings o'er the fen its ponderous knell,
> A far renowned alarum."

were quite as proud as he. "I'd prick him in the nose or eye and let it out, if I thought he had any of your blood," said Mr. Tindal. "There is Dishley blood in his countenance; I'd know him in the dark by his skin; can a goose, sir, produce an eagle?" was the unbending rejoinder.

Dishley has not deserted the old sort, but Mr. Bosworth has a divided allegiance, and 100 of his ewes are put to a Leicester ram and 150 to a Lincoln. The portrait of a two-shear prize wether, of Buckley blood, is a highly suggestive companion on the dining-room walls to that of "the inventor" of the New Leicesters. Of the original buildings none are left save the yard gateway, the barn, and the shell of the shepherd's house in the fields. The barn, whose roof is supported with large beams like those of Leicester Castle, is 48 yards by 15, and was once the granary of the Abbey of Garendon. Within a stone's throw of it is the little church, which has been shut up for more than twenty years. The lead still clings to its roof, but the doors are mouldering on their rust-eaten hinges, and the windows are broken in. Pigeons have made their habitation in every pew, and hatched their young in the reading desk. As you explore the aisle you wander like Ulysses amongst "infinite dung," and it takes a diligent student to scrape it away, and decipher the flat stone hard by the communion rails, which marks the last resting place of our "Shepherd King." We know of no mortuary parallel save that of the African chieftains, over whose kraal-grave the cattle of the tribe are penned on the funeral night.

Mr. John Breedon of Rotherby was the last survivor of the Bakewell Ram Club, whose rules bear date January 5th, 1790, and pledged the twelve members (who paid 10 guineas each) to "keep the transactions secret upon their honour." Mr. Paget was the President of the Club, which held its earlier meetings at the Bull's Head and The Anchor at Loughboro' alternately, and fined each member a guinea for non-attendance. Mr.

Walker, Mr. J. P. Stone, Mr. John Bennett, Mr. John Manning, Mr. Joseph Robinson, Mr. Nathaniel Stubbins, Mr. Nicholas Buckley, Mr. Bakewell, Mr. F. White, Mr. John Breedon, and Mr. James Knowles, composed the rank and file. The rules were made and kept with Draconic strictness. No member might sell ewes or lambs to breed from unless he sold his whole flock or dealt with members alone. Only 40 ewes could be taken in to tup, and those must be the property of one person. Not more than two dozen rams could be shown to any person or company at one time; and even members could only show their rams to each other between the 1st and 8th of June, when the general show commenced. On July 8th they were bound to rigidly seal their pens for the space of two months. Certain flockmasters were not to pay less than 100 guineas in their first contract, and after that 30 guineas for wether getters. Not more than 30 rams might be let by one member in one year, and it was further enacted that there were to be no dealings with flockmasters who showed rams in the market; and that the much dreaded members of the Lincolnshire Society should not have a ram unless four joined and paid 200 guineas for him. Mr. Bakewell was honoured with a private bye-law, which forbade him from letting a ram within 100 miles of Dishley at less than 50 guineas. Despite all these curious restrictions, in 1796 (the year after Mr. Bakewell died), no less than 16 English counties were in communion with the Club, as well as Messrs. Culley, Robertson, and Thompson on the Border. Coke, "Bedford," "Egremont," and Collings, were also honoured names in their correspondence, and there was a sturdy rivalry between Philip Skipworth and the Lincolnshire men who should bid highest for rams. The latter county had its flockmaster's "House of Keys" at the Reindeer in Lincoln, and drew up its rules "for the benefit of the public." They were framed somewhat after the Leicestershire model; and bound over the members not to show at a market, or let more than 100 rams, or serve ewes at less than 5 guineas each, unless 60 were sent.

The prices given for rams both then and early in the next century admit of some modification, and Mr. Stubbins's sale books, now yellowed and tattered with time, show that 500 guineas meant 420 guineas and so on. The copy of a letter in one of them sheds still further light on the secretive tendencies of the flockmasters of that date. Sir R. St. George writes to Mr. Stubbins in 1797, respecting two score of ewes which were to travel 80 miles by road. He prescribes the day's journey and thus cautions the shepherd: "He must not wear a round frock or any kind of fustian coat, or he may be taken notice of, and if

he is asked any questions, let him say 'I have orders from my master to answer no questions.'"

Mr. Bakewell's flock went after its founder's death into the hands of Mr. Smith of Dishley, and passed from him to Mr. Honeybourne. It was finally dispersed amongst Messrs. Stubbins, Stone, Barford, Paget, Baker of Elemore, and Philip Skipworth the elder, whose purchase of ewes laid the foundation of the present Aylesby flock, as that of Mr. Stubbins (whose nephews Joseph and Robert succeeded to moieties of his flock in 1814) did of the Holmepierrepont. The Leicester breeders outside the charmed circle of the Club, were also a great band, with Mr. Prinsepp of Croxall, Mr. Bettison of Holme, Mr. Creswell of Ravenstone, Mr. Burgess of Hugglescott, Mr. Green of Normanton, Mr. Moor of Thorpe, Mr. Astley of Odstone, Mr. Newton of Hoby, and Mr. Deverill of Clapton, as their chiefs.

None of the club's men had quainter sayings than Mr. Nicholas Buckley. He would vow that cocksfoot was good grass, and that if he "met with a sheep without a skin I'd have him;" but no one made a greater point of having his sheep well woolled all over, firm in their handling, and with rare legs of mutton. The late Sir Tatton Sykes was a staunch admirer of the sort; and for fifty-two summers he never once missed riding from Sledmere to Normanton to see his rams, with a tenant or his huntsman, Tom Carter, at his side. The Baronet was always on a young horse, and it was his custom to lead it for the last mile of his day's journey, which began soon after sunrise. He was wont for many years to come twice—on June 10th, to see the rams bare, and again the first week in September; but the first showing gradually dropped into disuse.

The Messrs. Stone,—John of Quorn and Thomas of Barrow,—had rather a larger sheep than Mr. Buckley, as well as lighter in the scrag and not so heavy in the coat. Mr. Farrow, of Loughborough, did well with big sheep, and made such an especial point of wool that the weight of each fleece was always printed on the sale-card. Mr. Stubbins, on the contrary, liked a "big park-ranging sheep," and laid more stress on firm mutton than wool. "Soft mutton," as he said, "you may feed for ever, and be no further forward." Mr. Creswell, senior, and his father, hired both from Mr. Stone and Mr. Stubbins, and the former hired rams from them thrice over at 300 guineas. Sir Tatton never failed to rally him on his love for size, and gave as a reason for not hiring from him that such a step would entail an enlargement of all the Sledmere doorways. The joke would have been capable of extension in later days, as one of the present Mr. Creswell's ewes has been in the habit, year after year, of bringing a 15 lbs. lamb, "be the same more or less," whereas 9 lbs. to 10 lbs. is a good average.

Sir Tatton's first purchase of ewes comprised half a score at

10 guineas each from the late Mr. Sanday. He was wont to say, "I would choose for myself, Sir, and I chose very badly; if there was one with very delicate, transparent ears, I took her." The ten came in the Holmpierrepont waggon to Lincoln, and there the enthusiastic young flockmaster met them with his shepherd and drove them a three days' journey to Barton Ferry. The Baronet loved a small, thrifty sheep, and he did not look for a very thickly planted fleece on the Wolds. He liked to feel for the cloven back in a ram as the index of good, firm flesh, and often pointed out with pride this little peculiarity in his chesnut blood sire, Daniel O'Rourke. Only grass, turnips, and hay were used in the manufacture of Sledmere wool and mutton; and cake, corn, and peas found no place in his fold-stores. In his earlier days he always bid stoutly when he fancied a lot, and at Mr. Robert Collings's sale he went as high as 156 guineas for the shearling Ajax rather than be beaten by Mr. Baker of Elemore. When the Cotgrave flock was dispersed in 1844, he went up to 100 guineas for the three-shear N by D R; and that "pillar of the flock," D H, who clipped 14 lbs., and died shortly before the sale, might have tempted him still farther. For some years before his death he used his own blood entirely, and let from 100 to 110 rams at Eddlethorpe to neighbouring ram-breeders and his tenants, who made a large muster. It quite brought back the Sir Roger de Coverley days to see him return their quiet salutations as he rode out of the paddock after a letting, with the Sledmere clergyman on a stout cob by his side. The letting in the September of 1862 was his 59th, and his last. His prices were not high; and he was, we believe, only once known to reach 60*l.*

He never would prepare anything for show, but the Sledmere blood has gone well to the fore since his death, both in the hands of Lord Berners and Mr. Borton, at the Royal Agricultural and the Yorkshire, as well as the Christmas shows.

On the afternoon of June 19, 1798—just five years after Mr. Paget, the President of the Bakewell Club had sold a pen of ewes at 62*l.* a-piece,—Holmpierrepont in Mr. Nathaniel Stubbins's hands, became a Dishley removed. The sum total of the lettings on that day was 31 rams for 2,176*l.* 18*s.*, and Philip Skipworth went as high as 600 guineas. Seven years after, the ewe-serving charge had not only been raised to 300 guineas for 70 and 200 guineas for 40 ewes; but in 1805 the letting average was nearly 100 gs. for 31 rams—subject to a liberal private discount. In 1814, the division of the flock took place between Mr. Joseph and Mr. Robert Burgess, the former remaining, as he had done in his uncle's life time, at Holmpierrepont, and the latter going to Cotgrave Place. In about four years, the brothers joined flocks and lambed about 20 score of ewes annually; and Mr.

Joseph Burgess sold his moiety of the flock in 1834 for 4,772*l.* 18*s.* at the hammer. Mr. Sanday, whose father and grandfather had both been ram breeders, came to Holmpierrepont in the same year, but as long as the ram lettings continued at Cotgrave Place, he confined himself to wethers, and won the gold medal with a pen at Baker Street in 1842. The lettings at Cotgrave Place were private, and the ram breeders of England and Ireland made a great array in those three June days, two of which were devoted to showing and the last to letting. Prices had "settled" considerably since "the golden fleece era," and 12 guineas for 74 was the letting average in 1834. Fifty guineas was spoken of as a good price for a ram, and Mr. Samuel Bennett of Bedfordshire was thought a man of no small mettle to give 110 guineas for a shearling three years afterwards. The average then kept creeping up, and reached its limit in 1841, when 117 rams were let within a fraction of 22 guineas. Henceforward it declined, and on Mr. Robert Burgess's death in 1846, the Leicester venue was laid at Holmpierrepont, and the late George Newton came from Cotgrave Place as shepherd. Mr. Burgess's flock of 450 was sold in 1847 for about 4500*l.* or nearly 1000*l.* more than Mr. Sanday had offered for it ten months before. Eighty of the ewes and gimmers, with the pick of the 200 home ewes, ten of the Buckley's, fifteen from Mr. Hewitt's, and ten from Mr. Mann's of Spaldwick, formed the new Holmpierrepont ewe flock, which generally numbered about 180. N. by D R from a Holmpierrepont ewe came with them, and as Sir Tatton who had hired him the year before, was fully alive to his merits, Mr. Sanday did not get him under 105 guineas. He was well worth the money, and W H and L X, D A and D N with the rare forequarters, all left their impress on the flock. The highest letting average was 30*l.* 12*s.* for forty in 1859, and 111 guineas was given by Mr. Thunder for a shearling the following year. Mr. Sanday won his first Royal Agricultural Society's prize at Northampton in 1847 for shearling ewes. In 1854 no prizes were given, and in 1856 and 1858 he did not exhibit. At five shows he won all the firsts, and according to the Stewards' Report of the Royal Agricultural Meeting at Worcester, where he showed for the last time, he won fifteen first prizes, seventeen seconds, and ten-thirds for rams; eleven firsts and ten seconds for shearling ewes; besides eighteen high commendations in fourteen years. His sales in 1862-63 produced 5378*l.* 12*s.* 6*d.*, or an average of 19*l.* 12*s.* for 173 rams, and of 6*l.* for 333 ewes and gimmers; and the highest ram price was 140 guineas for the (three shear) gold medallist at Battersea.

The Dishley blood found its way to the Border in 1767, through Messrs. George and Matthew Culley, one of Crookham Eastfield, and the other of Wark, who went from the banks of

the Tees to the Tweedside. One or both of the brothers had been pupils of Mr. Bakewell. They were in partnership to the end of their lives, but took up different lines; George undertaking the management of the flock, while Matthew was more devoted to agriculture, irrigation, and essays. In process of time, Mr. Robert Thompson, who had also studied under Mr. Bakewell, established a Dishley flock first at Lilburn, and then at Chillingham Barns. The late Mr. Grey of Dilston confirms Mr. Wilson's pamphlet as to this point, and adds that there were two distinct Dishley families upon these Border farms. We meet with no notice of these two tribes of "bluecaps" and "red legs" in any Bakewell records, but they have often been described to us by Mr. Grey. The blue-headed Leicesters, which are now quite out of favour on the Border, were generally rather tender when lambed, and soft-woolled on the scalp, which made them very sensitive to fly galls. They were handsomer and of greater length than the "red legs," very good feeders but rather delicate, and light in their wool. Mr. Robertson of Ladykirk, and Mr Thompson of Bogend, his tenant, bought "blue caps" from Mr. Stone, which came, three or four in a cart, from Leicestershire, and were met halfway. The "red legs" were nearer the ground, very compact, with less fat and more fibre, and were generally hardier and had a more closely planted fleece.

The Culleys and Robert Thompson, and the Kelso and Northumberland men, came to the Ladykirk lettings, as well as McDougall's of Cessford. At Chillingham Barns the fleeces were hung up and ticketed for the early show, which gradually merged into the September one. A few small men had Cotswolds and Lincolns, but a great upstanding sheep was not then the fashion on or over the Border. Mr. Grey, who joined the ranks of the flockmasters soon after the beginning of the century, had his "large Gs" from Messrs. Culley and Mr. Thompson, but he liked the thick, short-legged Buckleys better, and stuck to the sort for wether breeding. About 1815-20, Lord Polwarth's agent bought some of his "large G" gimmers, and also went for rams to Mr. Jobson of Chillingham New Town. Luke Scott of Easington Grange, near Belford, was a great character in those days. He clung to his little flock of twenty Bakewells with desperate tenacity, even when his farm was gone and he had to board them out. After Mr. Robert Thompson's retirement, he would use no rams but his own, and when a very favourite ewe broke bounds and was tupped by "a neighbour's mongrel" (as he called it), he slaughtered her without mercy.

Such were the pioneers of the Leicester blood, and we may now inquire into the result of their labours. As a pure breed, and more especially as a cross to give early maturity, size, and eece, it has no rival from the Shetland Isles to Penzance. The

native Shetland ewes, with their 2 lb. fleece, and three-year old mutton, at 4 lb. a quarter, have "nicked" so effectually with rams of the breed that the produce is bought up readily by a certain class of dealers for the South. It has also had its full share in "improving away" the native Orkney sheep, which were such connoisseurs in sea-weed, and such a puzzle to the cottiers upon "sheep run day." Both these Island groups send Leicester-Cheviots or "half-breds" to the Aberdeen and Edinburgh markets, and some of the largest flock-masters in the Orkneys have a Cheviot and a half-bred side of the hill, and put all the older ewes to the Leicester. It is nearly fifty years since the latter were introduced to Caithness by Mr. Horne of Scouthal, but the lack of draining and enclosures was against them. Border size is a great object with the Caithness ram-breeders, two or three of whom are amongst the highest bidders round the Kelso rings. Some of the farmers in that district return the compliment by buying annually several score of half-bred wether hoggs at the Georgemas tryst. The three-parts bred "Caithness gimmers" have also become so popular, on account of their length and hardihood, in Morayshire and other great feeding counties, that the breeders now make a point of separating them from the wether hoggs when they are pitched for sale. The clayslate rock, which lies very close to the surface in many parts of Caithness, is said to communicate a peculiarly lustrous quality to the fleeces, and the wool commands quite as high a price as the East Lothian in the auction marts. Kelso rams are used to the Cheviot "cast ewes" in Easter Ross; and on the fine turnip soils of Morayshire, between the Findhorn and the Spey, they and the English Leicester have quite superseded the Southdown as a cross, both on the score of wool and climate. Banffshire stood second a few years since in a very large class of shearlings at Kelso, with a ram of Border upon Sanday and Wiley blood. In the "twenty parishes of Kincardineshire" the Leicester is used extensively, as in Captain Barclay's and Mr. Boswell's day, to Cheviots, half-breds, and blackfaces. It is also bred and used to the same class of ewes in the Kinnaird valley, and the dwellers near the Seidlaw Hills in Forfarshire remember how Keillor Watson" kept his "Bakewells" under a 500 yards altitude on their sides, and the Southdowns on the ranges above. On the braes of the Carse of Gowrie, Lord Kinnaird has had Leicesters for more than thirty years, and puts them to Oxford-down ewes, besides keeping up a pure flock. Perthshire can also draw its ram supplies from Strathallan Castle and Keir. Lord Strathallan's go principally to the Ochil Hill farmers, who put them to Cheviot and black-face ewes, and sell the lambs to the farmers in the valley; while the Keir rams, which are principally of Border with a

slight infusion of Yorkshire blood, are sometimes dispersed at the annual roup over ten or twelve counties. Clackmannanshire also breeds Leicester rams for its own use, and half-bred and "mule" lambs for the Fife feeders. The latter buy largely of the same sort, as well three-parts-bred lambs at St. Boswell's and Melrose fairs. They also buy half-bred hoggs from the House of Muir trysts, ; and Doune furnishes many blackfaced "cast ewes" from Argyleshire and Perthshire, to put to Leicesters in West Lothian.

At St. Boswell's (July 18), half-bred and three-parts-bred lambs from all the lowland districts have quite replaced the original rough Cheviot hoggs, and three-year-old blackfaced wethers and wether lambs. Melrose Fair, which is held a month later, now brings out, instead of St. Boswell "shots," a large number of half-bred and three-parts-bred lambs, many of them from the higher ground where the Cheviot once was supreme. Leicesters on Southdowns, blackface, and Dorsets, supply much of the winter lamb for Edinburgh and Glasgow; and the Lothian farmers find it more profitable to feed half-bred lambs for eight months than three-year-old Cheviot wethers for the same space. The East Lothian men put half-bred and Cheviot cast ewes, from the upper and midland districts of the Border counties, as well as Selkirkshire, to the Leicester, and also breed "mules" for Yorkshire on farms at the foot of the Lammermoors. They like the true Border type of ram, high on the leg, and round in the barrel, with open coats, to correct the closeness of the Cheviot, and go against "the bare-bellies," which do not suit for folding on their heavy clays. They also prefer to see them with as little wool as possible on their heads, so as to keep up the half-bred character in the lambs.

Half-bred ewes are put to the Leicester for St. Boswell's and Melrose lamb supplies, in Gala Water and all along the low district from Edinburgh to Hawick. The ewes which are wanted to produce half-bred lambs on the arable farms come from the hill flockmasters, who generally sell about two-fifths of their Cheviot ewe lambs for the purpose. Some farmers breed Cheviot ewes for themselves when they have a hill and an arable farm as well, and the half-bred system can be pursued with advantage at a considerable height above sea-level. It extends up Teviotdale, Ewesdale, and Liddesdale, and along the Kale and Bowmont Water to the foot of the Cheviots. It follows the course of "the shallow, brawling Tweed," beyond Peebles, and nearly to Lanark, and invades even the Vale of Yarrow. It has also pushed its way into the upper parts of Dumfriesshire, and all along the line from Dumfries to Carlisle; and not a few "Penrith hoggs" are turniped in Dumfries. Half-bred rams are also ecially bred in Bowmont-Water from five shear Cheviot ewes

in the height of their milk, and they are sold as high as 12*l.* at Kelso, but Leicester on half-bred answers best. Breeding "mules" is a great Lanarkshire fancy; and the English dealers bring Leicester rams and take back black-faced hogg "shots" to put to the Leicester in Yorkshire.

"The Barmshires," or Border Leicesters, are peculiar to the Border counties of Roxburghshire, Berwickshire, and Northumberland. Mr. Angus, of Whitfield's, flock, is, as it were, the herald of the breed, as you approach the district from the Newcastle side, but the flocks are all smaller on the clays. The old grass begins beyond Morpeth, and the traveller north by the rail skirts the farm of the Rev. Mr. Bosanquet, of 'The Rock,' who annually sells 100 rams at Kelso. They flourish on the banks of the Bowmont-Water and all along the spurs of the Cheviot range, but more especially in the warm and sheltered barley and turnip soils round Kelso and Coldstream. Unless a hill farm is annexed to the arable, the whole flock consists of Border Leicesters, and the South Country Leicesters, or "blue head," is proudly eschewed. The leading flocks have rather marked peculiarities. Some excel both in size and fleece, while others have lighter fleeces and smaller scrags, but more quality and fashion. A very big head is the characteristic of one or two flocks, and another can generally be told by "the bridge in front of the hock." Still, of late years, there has been so much interchange of blood that they are fast becoming more of one type, especially in their wool, which has acquired much more staple and curl. The ewes, which are remarkably good milkers, should lamb about the middle of March, and when weaning time is come the farmer will often give you the choice of "yow or cow" when the cheese is put upon the table. The lambs are dipped a week after the ewes are clipped, so as to keep the ewes clean. Wether hoggs should be quick off the shears, and not be kept above fourteen months, when they generally reach from 18 to 19 lbs. a quarter. Their wool averages from 7 to 8 lbs. all round, and a highly fed tup-hogg will clip to 12 lbs., according to the nature of the soil. Clay land is favourable for wool on the belly, but the finer bred they are the greater the difficulty in preventing it from peeling. The lambs are generally born with a top-knot, but it comes off; and if their whisker or their scrag wool is very plentiful, they are pretty certain to peel below. Rams which have this tendency are generally capital graziers, and get better fat lambs, and are therefore in good request for crossing. Their hocks should be rather away from them if they are to follow Cheviot ewes on the hill side, and to travel on the undulating farms from the banks of the Tweed to the Bowmont. They should also have plenty of bone, and not be round in the shank. The heads should be long and thin, without any tendency to a blue shade,

the ears broad and erect, the nose brown coloured or hazel, with an open nostril and a large expressive eye. The scrags are hard to keep up to the proper thickness, but still the leg of mutton or the gigôt is the prime difficulty; and there is also a tendency to be too fat on the rib. As with the Dartmoors, a wide tail is a great point. Since the introduction of so much artificial feeding, the size has been considerably increased, and the ewes are generally fatted off after three crops of lambs at from 26 lbs. to 30 lbs. a quarter. St. Ninian's, near Wooller, is the great fair, late in September, for the cast ewes, but some are sold at Cornhill, where they made as much as 63*s.* to 60*s.* the autumn before last. Penrith dealers have been the principal ewe buyers at St. Ninian's for the last five-and-forty years, and take on nearly all the lots to the York and Harewood fairs. The best ewes are nearly always picked up by the dealers in the pastures, and the price is governed by St. Ninian's. Mid-ewe lambs are not sold, but are generally fed off as shearlings with the wether hoggs and the shot gimmers. Some of the best gimmers have fetched 20*l.* apiece to go to Ireland.

Lord Polwarth's rams, as well as those of a few other flock-masters, were sold by auction at home for many years. In 1846 the Kelso public sales were established on the second Thursday in September, and 350 rams were entered, but 13*l.* was the highest price. Lord Polwarth's were first brought to Kelso in 1852. In 1820 his Lordship's home-average had only been 3*l.* 15*s.* for 35; whereas in 1865 it was 37*l.* 18*s.* 10½*d.* at Kelso for the same number. His Lordship's top sheep went for 95*l.* that year, and for 106*l.* in 1867. The supply of rams has become so large that some breeders in "the little kingdom of Scotland and Northumberland," as it is called, have preferred taking their lots into the Edinburgh sale ring; but even with this slight take off, upwards of 2300 rams, the property of between fifty and sixty breeders are sold annually in the four rings at Kelso. There are two or three grades of purchasers among the Irishmen who come over in large numbers. Some go up to 15*l.*, but a great many cannot be tempted beyond 7*l.* The Caithness men bid with great spirit, and there is generally a commission from North Wales, at least every other year. Lord Penrhyn is in the habit of getting them to cross his pure Leicesters. The cross produces a hardier sheep, with wool as fine and a little longer in the staple. The order of sale in the four rings is decided by lot. Lord Polwarth's always make a very high average, however low down in the list they may be drawn; but it militates very severely against the great majority of the lots if they are put up after two o'clock. Still a lot of 85 from a noted breeder has made as much as 11*l.* 2*s.* 8*d.*, and 100 have also gone off pretty late in the afternoon at 10*l.* 12*s.* 7*d.*

Durham and Yorkshire have been quite the home of the

"Bakewells" since the days of the brothers Collings, whose ram sales were attended by Sir Tatton and Mr. Wiley with unswerving regularity, and did much towards establishing those county flocks. The large-boned, hornless Teeswaters, "as big as a jackass, and with long watery wool, whose sixteen-inch fibres might be counted," according to Mr. Wetherall, were reduced by a cross with the Leicesters, and their grazing qualities so much improved that the original type is wholly lost.

The Lincolns have been introduced on the Yorkshire Wolds, but they did not answer, and required higher keeping. Many farmers both in this and other counties have tried one cross of the Lincoln on their Leicester ewes, and gained wool and size without a sacrifice of that aptitude to feed which is the Leicester's great characteristic; but the second cross does not answer, as the mutton has a tendency to be coarse. A few Lincolns are still sent annually to the Masham districts of Yorkshire, which have what they call a "Mug" tup, or Leicester of their own. He is not a relic of the Teeswater; and a "New Leicester" man will not look at him. He stands well on his legs, and can travel through the heather after the active speckle-faced ewes better than the short-legged Leicester, which would "weary to nothing" in such ground. The rams are hardy, and clip from 8 lbs. to 10 lbs. of wool, and in very rare instances 12 lbs.; while the ewes average 6 lbs. to 7 lbs. of wool, and are very prolific. The wethers will make up with good keep from 20 to 24 lbs. in eighteen months; but several of them are not cut, and dealers carry on a large trade by taking them to Scotland. Many of the best ones find a ready sale at Masham, Kettlewell, and Skipton, where the farmers won't look at a pure Leicester, and 15*l.* has been made for "a regular topper." They seem to spring from a union of the Leicester and Teeswater, but there has been no "crossing out" for many years. A tendency to feather down below the hocks is avoided as much as possible in the rams, and so is too much wool on the head. The heaviest woolled sheep are not chosen for the moor, but rather those with a light ringlet staple.

Almost every farmer in Wensleydale who has a little lowland keeps a few "good-bred ewes" of the sort, which they put to rams with the biggest fleece they can find. Many of them are sold about Askrigg Midsummer Fair, but the best are kept back until later in the year. This "Blue-cap" sort, as many term them, came into special notice some seven-and-twenty years ago, when one of them by a pure Leicester from a half-Leicester and Teeswater was shown at the Liverpool Meeting of the Royal Agricultural Society. In shape and make he was a pure Leicester, but was thought rather too big.

The ewes which the "Mug Leicester" follows on the moors are principally brought as gimmers to Askrigg Market, from

Lanarkshire, and have fetched as much as 45*s.* each. Such is the eagerness of the farmers in the district, that they go the day before to meet the droves, and buy them up before they see "the hill." The Craven farmers have the longest purses, and hence the small dalesmen have to be content with their leavings. The "shot ewes" do not come from Scotland until the autumn, and are bought for making fat lambs in the lowlands.

"Masham lambs," or the half-bred produce of the "Mug Leicester" and the Scotch ewes on the moor, are generally bought by dealers and resold at York Market for Derbyshire and the Midland Counties, and as well as for many districts of the East and West Ridings. They are first put on the stubbles after harvest, and these, if late, always affect their price, which has ranged from 18*s.* to 35*s.* for the best. The Moor ewes generally run there for four or five years, and if a ram suits them, no money will tempt his owner, and he is kept till he is almost a skeleton. Sometimes these half-bred or "mule" gimmers are crossed again with the "Mug Leicester" for fat lambs or stores, and in weight of wool and carcase they run the Leicester hard if well done to throughout. The half-bred ewe generally breeds and nurses well, but she is seldom kept more than two years on the moor; and after one crop of lambs on the lowlands she goes off fat to the butcher. "The Swaledale lambs" are another and a very hardy sort, between the "Mug-Leicester" and the native horned sheep, which abound in Swaledale, Colsterdale, Dallowgill, and Akengarth, &c., and have close short coats and a hard touch. They go to the wildest parts of Derbyshire at very much lower prices than the lambs from the Scotch ewes, and are not nearly such good feeders as shearlings.

As we thus glance rapidly at the effect of Leicester crosses from Caithness to Cornwall, we may be excused under the special circumstances of the year, for dwelling upon Leicestershire flocks. On the Harboro' side of the county, owing to the recent prices of wool and the breaking up of land as ancillary to pasture, they have steadily increased in size. The land round Loughboro' is still famous for its wool and has plenty of turnips and winter keep, but on the Hinckley side, where the tendency is to lay down rather than break up, the flocks are smaller and seldom number more than 50 ewes. Very few flockmasters keep on an average more than 200 ewes. The soil of the county does not colour the wool like that of Devon and Somerset, as the rams' coats prove when they return from service. The Belvoir tenants go a good deal into sheep where they have sufficient grass; and sometimes take two clips of wool, and winter their young sheep on the grass with cake and turnip, but scarcely ever with cabbage. Those on the plough land generally sell their lambs at Grantham Mid Lent Fair.

The blue-headed Leicester is most liked, and the top knots are kept on the ewes as a preventive against fly-gall. Many of the Duke of Rutland's tenants use the Lincoln ram, as they consider them hardier than the Leicester, and as adding nearly 2 lbs. all round to the fleece. Lincoln ewes are not in much request, as their fleeces become very much clotted upon strong land. Cotswold ewes are thought bad feeders, and are rarely to be met with, but Wiltshire Downs and Dorsets have been introduced for the sake of putting to the Leicester for early lambs. Leicester, Lincoln, Shropshire, and half-bred Leicester-Lincoln rams are all used more or less. The "Shrops" have come into high favour as a cross with the Leicester ewes, except on the Harboro' side, where the wool is finer in the staple, but not so heavy. They show great constitution on wet land and very few ewes miss to them. The cross averages as much as the pure Leicester in weight, but the latter cuts fully 1½ lbs. to 2 lbs. more wool. Both local and London butchers like "the black foot in them" as they phrase it. The great advantage of the union is that the lean flesh of the Shrop corrects the fat back of the Leicester, while the latter contributes thriftiness and weight of wool. Some farmers breed from the first cross and very seldom go beyond, but two or three flocks have been crossed from Leicesters into Shrops, as black-faces were into Cheviots on the hills near Beattock.

Mr. Meire, the great Shropshire improver, first used Leicesters on his Shrops to give them fatter backs, and then Southdowns to darken the faces. The Leicesters are also gaining a strong hold, both pure and as a cross, on those Herefordshire clays, of which the Ryeland once had a monoply. The late Mr. Fisher Hobbs gave it as his opinion, that the climate of Essex did not suit the sort, and was unfavourable to the growth of wool. In Warwickshire the Hampshire Down ram on Leicester ewes is producing tegs, which with high feeding have sometimes weighed 26 lbs. a quarter in April. It has also proved a good cross for the Romney Marsh ewes, though the lambs of the first cross did not stand the Marsh so well as the native Romney, and it has not been found advisable to carry it on to a second. It nicks well with the Exmoor, and takes out the horn at once; and Mr. John Overman has demonstrated for several years in the great Christmas shows its high feeding properties when combined with Southdown. Pure bred Leicesters were thought too small for the Norfolk men, and latterly the great staple of their mutton supplies have been by rams—in which Leicester, and Cotswold, and Lincoln are most judiciously blended—crossed with the Hampshire Down or native ewe. The Cotswold on Leicester cross has never been very happy, and the produce often comes rather nondescript in shape, and with a tendency to lumpy shoulders.

Devonshire and Cornwall men have always been steady

customers to the Leicester breeders, and have had good ones on their own account. The former have in fact kept nearly as keen an eye on the Leicester pens at their shows, as on the "red and all red" in the cattle ranks; and Mr. George Turner has for a series of years been a successful breeder and exhibitor of both at the Royal and the Bath and West of England shows. Early in the century Mr. Peters, of Penhallow, brought several waggon loads of Leicesters, as well as shorthorns, from Bristol, where they arrived by ship, and said that they were the "twin regenerators. Still some of the Cornwall ewe stocks are of a very dubious kind, especially on the high grounds, where they work on the heather with the snipe. Many of them never taste a turnip, and have scarcely any curl in their wool. The granite on these hills does not suit them, as there is a formation above it through which the water cannot percolate. The formation at a lower altitude is the serpentine or greenstone, and when the greenstone is broken up, and the yellow marl under crust is brought to the surface, it is excellent corn and turnip land, and well adapted for grass or turnips when drained. Two-thirds of the sheep go into the Bristol and London markets, and while the Leicester ram keeps up his price to improve the ewes, the Shropshire ram is also in vogue to put the coveted "black-foot" on to the half-breds.

What the native sheep of Ireland were like before the introduction of the pure Leicester, is told with hideous fidelity by George Culley, when he explored that country—Arthur Young fashion—towards the close of the last century. None of the original breed that we can hear of are left, and those who wish to see what the Leicester cross has done, have only to glance over the 80,000 to 100,000 sheep which are annually pitched at Ballinasloe. Perhaps no other fair of the size in the United Kingdom can produce such a level array. The top lots, two-year old ewes and wethers, are really wonderful sheep, and yet they have not tasted a pound of cake or any artificial food. In fact, the system of putting sheep on turnips is quite in its infancy in Ireland. If well kept, the hoggs will cut from 6 or 7 lbs. of wool; it is shorter and closer than any of the breeds used for crossing, and yet more open than that of "the original natives."

With the last named, the Dishley "nicked" exactly, and reduced the size while it increased the weight of wool, and gave an aptitude to fatten early. As high as 111 guineas has been given for a ram, but the sale of pure Leicesters has not been so good of late years, as breeders have gone for greater size. The Cotswold cross was a failure, the Lincoln has done no good, while the Border Leicester has made great headway. A pure Leicester flock is not suited to Ireland, as the climate is too wet for them, and they become delicate. The ewes are not found to milk well, and the lambs cannot bear up against the damp

climate, unless highly kept on artificial food. As a cross for the native breed they are unrivalled. The Shrops, on the contrary, do well as a pure breed; but their wool is against them, and they have been principally used for getting early lambs from the improved native ewes. The "mules" between the Leicester ram and the Scotch black-face are also in considerable favour. Among the earliest improvers of the sheep the name of Mr. French will always hold its place. Mr. Astley, of Odstone, in Leicestershire, was one of the first who brought over rams to Ballinasloe fair; and Mr. Robert Holmes imported the best ewes and rams he could get from the Burgesses. Gradually the taste for a rather larger sheep set in, and for fifteen years at least, the breeders have returned full handed from the Kelso ram sales, and the Border Leicesters have carried the day. At the Royal Dublin Society's show the largest prizes are given to Leicesters, and both descriptions of them have classes to themselves.

A few words upon the last of the old-fashioned Leicester breeders and we have done. Mr. Valentine Barford, of Foscote, in Northamptonshire, had the same sturdy self-reliance as Luke Scott, but under a happier star. He and his father before him had held one farm under the Dukes of Grafton for more than a hundred years. It was their fixed belief that the Foscote flock was the only one in the kingdom that could "present an unbroken pedigree from the time and stock of Bakewell." They got their blood originally from Mr. Joseph Robinson, of Wellingborough Lodge, who was a member of the Club from 1783 to 1803 inclusive. The sheep, "ironically called Lumber," was used for two seasons, and then they dipped deep into the blood of "Dishley A." In 1810 they ended with "No. 4 of 1810, by a grandson of C, alias Cade, alias Cuddy, of 1802," and bred henceforth entirely from their own flock. Firm mutton, a well-arched rib, a deep chest, and hardihood of constitution, were Mr. Valentine Barford's cardinal points, and he would not allow that he had held by purity of breed at any sacrifice of mutton. If his sheep had not the size of other pure Leicesters, he maintained that many more of them could be kept for the same money, and that there were always "more customers for a small neat joint." He did not profess to pick over his rams for the ewes, on the ground that "the worst is as likely to get good stock as the best;" and he wormed all of them before he sent them to the butcher. When other breeders paused to read the pedigree papers, which he annually placed above his pens at the Royal Agricultural show, he used to tell them, in his pleasant way, that he studied nature, and that the reason he dared to show his sheep quite bare was to prove that "I can breed them of the shape which you clip them into." Poor George Newton could not understand their shapes at all, and was heard

telling a brother shepherd, after a protracted survey, that "there must be a touch of the goat about them."

At home Mr. Barford loved to be among his bees; he said that there was no cross-breeding there, and that he had learned many a lesson from them in his craft. "Then if a wasp came, I suppose it would be a Cotswold or a Lincoln," was a reply which pleased him well. In the paddocks his sheep would follow him up and down, looking, as he would say, "as plump and as much alike as partridges;" and his presentation picture represented him with a book in his hand, as if he were reading or preaching to them "upon the claims of long descent." Cake and corn he passed by with contempt, and maintained that pure Bakewells should be "fed on vegetable food only, and be open for inspection at all times of the year." He could boast to the last of his full share of doublets, and his shepherd, who was as old as himself, could say to any visitor, "Maister, touch 'em across the hips—no trouble in lambing, I never helps them."

The folding doors in the hall at Foscote were always taken down on his great day, and the same homily on careful in-and-in breeding was delivered each year from the head of his table after luncheon. Passing through his black-breasted reds, which were all bred on the same principle, you reached the show sheds. The rams, which he generally let at from 7*l.* to 14*l.*, were tied up by the head like ponies in the first of them. They were not inspected there, but the company seated themselves on benches in the next shed before luncheon, and each sheep was led out. The visitors might get up and handle them, and then enter the other shed for the same purpose when the lots had all been on parade,—but "handling one was handling all."

It was a great matter with him to have no top-knot, and yet to keep a hard, well-woolled head, which could always defy the fly. The top-knot never made its appearance by any chance at Foscote, and when one of the rams was put to a score of Cotswold ewes in Oxfordshire, there was no trace of it among the lambs. In order to pursue the experiment, six ewes of this cross were selected and put to a Cotswold ram with an especially grand top-knot, but the lambs of that generation lacked it, and it only returned after a third Cotswold cross. None of the lambs with the Barford blood in them were attacked with diarrhœa, and they all came as large as Cotswolds. The recital of such facts is but due to the old man's memory. We give them on the authority of the Cotswold breeder who made the experiment. No testimony could be more impartial, and no proof more sure, that even if size has been sacrificed to an honest belief in a monopoly of the Leicester tap-root, no blood can stand the test of time, and hold its own in a cross, unless it has been kept "as pure as Eclipse."

XXV.—*On the Home Produce, Imports, and Consumption of Wheat.* By John Bennet Lawes, F.R.S., F.C.S., and Joseph Henry Gilbert, Ph. D., F.R.S., F.C.S.

It is almost a truism to say that the characters of the seasons exert a very great influence on the amount and quality of our home-produce of wheat from year to year; and that upon the amount of food which the crop supplies depends very materially, though less than formerly, the general prosperity of the nation. In a very able paper by Mr. Caird,* devoted in great measure to the pointing out the important bearings of the Agricultural Returns for 1866 and 1867, which were presented to Parliament last year,† he estimates the cost of the wheat and wheat-flour consumed in the United Kingdom at 30,000,000*l.* sterling more for the year, in consequence of the bad season of 1867, than after the good harvest of 1863; and that, out of this total extra cost, 27,400,000*l.* more would have to be paid for foreign corn after the bad harvest than after the good one. He calls attention to the influence which such a result must have upon the trade of the country, and insists upon the great advantages which would accrue from early knowledge as to the area and yield of our various crops.

Hitherto the objections of farmers, whether valid or otherwise, have been sufficient to prevent the legislature from requiring returns to be made on these and other points comprised under the head of 'Agricultural Statistics.' In Ireland for a number of years past, and in Scotland also for a few seasons some years ago, returns have, however, been collected. But it is only during the last two years that voluntary returns have been collected throughout the United Kingdom, as to the number of acres under each crop, and some other points; and in regard to the important question of the amount of produce obtained, either per acre or in the aggregate, no returns whatever have been collected; nor is any really reliable information available on the subject.

To meet this want, the managers of some of our best conducted agricultural papers have, however, bestowed much care and trouble in collecting, just before harvest, from correspondents residing in various parts of the United Kingdom, opinions as to the probable yield of the various growing crops. But as these returns are, for the most part, made before the crops are fully

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* Read before the Statistical Society, March 17, 1868; and afterwards published as a pamphlet under the title of 'Our Daily Food; its Price, and Sources of Supply.' Longmans & Co.

† Agricultural Returns for Great Britain, with Abstract Returns for the United Kingdom, 1867.

ripe, they sometimes require considerable correction afterwards, either in consequence of changes in the weather before the produce is secured, or when the results of the thrashing-machine are known. Then, again, the terms "average," "over average," and "under average," which are chiefly used in describing the crops, are but vague and indefinite. They are, nevertheless, preferable to those which are much more definite, when applied to crops not even harvested. The returns so collected are, however, not only the best at our command, but they are extremely valuable.

As is well known to many of the readers of this Journal, wheat has been grown in a 14-acre field at Rothamsted, for twenty-five years in succession; the field being divided into plots, some of which are unmanured, one receiving farmyard manure every year, and the rest receiving, each a different description or amount of artificial manure; the same description and amount of manure having been applied to the same plot each year, for the last seventeen years. In all other respects the management is the same over all the plots each year, and, as far as possible, the same year after year. The result is, that the difference in the quantity and quality of the produce from year to year is mainly due to the varying characters of the seasons. Most of the plots are 6-10ths of an acre each, but some are only 3-10ths.

After careful observation and comparison, for a series of years, of the fluctuations of result obtained in the experimental wheat-field from year to year, and of those in the crop of the country generally, it was thought that the results of certain selected plots would afford an useful indication of the general character of the wheat-crop of the country. Accordingly, for the last six years, as soon as the crop was thrashed, a statement of the produce obtained on those plots, together with such comments as seemed appropriate, has been sent to 'The Times' for the information of those interested in the subject. Referring to the results in that field, Mr. Caird, in the paper above quoted, says that they "have proved a very satisfactory index of the general yield over the chief wheat-producing area of the kingdom, and are indeed the most instructive series of facts for the guidance of the British corn-grower on record."

However valuable and instructive the records in question may be, in default of more directly applicable information, it will, nevertheless, be seen further on, how very requisite is more exact knowledge than can possibly be acquired by such means, to enable us to form really reliable estimates of the total, or even of the acreage, yield of wheat in the country at large. At the same time, the collecting together and attempting to apply such data as we do possess, will of itself be instructive; and it is hoped that the course of the inquiry will at least bring to view

some useful and important facts in regard to the *home-produce*, the *foreign supply*, and the *consumption* of *wheat*—undoubtedly the most important staple food of the population of the United Kingdom.

For various reasons it will be convenient to confine the illustrations to the period commencing with the harvest of 1852 and ending with that of 1868. Thus, so far as the results in the experimental wheat-field supply data for the calculations, the season of 1851-2 is the first that could be brought under consideration; since, before that date, there was not the perfect uniformity in the description and amount of artificial manures used year after year on one and the same plot as there has been from that date to the present time. Again, not much before that time had producers and importers thoroughly made up their minds as to the influence on their relative positions of the changes brought about by the establishment of free trade in corn a few years previously; nor, perhaps, had the effects of that great change on the consumption of wheat been, much earlier, thoroughly established. The year of 1851, indeed, terminated a period of lower prices of wheat than have since prevailed. In the week ending October 11th, 1850, the Gazette price of wheat was 35*s.* 6*d.*; in January, 1854, under the combined influence of a previous bad harvest and of war, it reached as high as 83*s.* 3*d.*; and, during the past summer, the price has been twice as high as in the first year of the period selected for our review. In the three successive *harvest-years* (Sept. 1—Aug. 31) 1860-1, 1861-2, and 1862-3, there were imported into the United Kingdom from 9,000,000 to 10,000,000 quarters of wheat annually; or, in the first of the three, more than, and in the other two nearly, as much as, would supply the total flour and bread consumed by one-half of the then existing population. In 1854-5 and in 1855-6, on the other hand, the imports were only sufficient for the requirements of about 17 per cent. of the population. We have also had within the period, in 1853 probably the worst harvest since 1816, and in 1863 the most productive since 1834.

Since 1852 the population of the United Kingdom has increased by about 3,000,000 = about 11 per cent.; and, independently of this great increase in the actual number of the consumers of flour and bread, it is pretty certain that the amount consumed per head of the population has also increased: in Great Britain, perhaps, more directly as the result of Free Trade in corn and the relaxation of many other restrictions on trade and commerce; but in Ireland in a greater degree than in either of the other main divisions of the kingdom, as one of the results of the much-lessened yield of the potato-crop.

Before attempting to apply the results in the experimental wheat-field as a means of estimating the home-produce of wheat from year to year, and the consequent dependence of the population on home and foreign supplies respectively, it will be well to show how far the fluctuations in the experimental crop, according to season, have accorded in general character and direction with those in the crop of the country at large, so far as these are ascertainable by reference to the published opinions of various authorities, at the time or afterwards.

With a view to such a comparison, and at the same time to provide for reference, in a very summary form, an useful record of the wheat-producing characteristics of the different seasons, there are given in the annexed Table (I.), some of the results obtained on certain selected plots in the experimental wheat-field; and, side by side with these are given in the notes, after much more detailed compilation in the first instance, and as correctly as possible consistently with the necessary brevity, the substance of the opinions of the various authorities quoted. The plots selected are those the results of which have been published in 'The Times' shortly after harvest for some years past, as already referred to, namely:—

Plot 3. Permanently unmanured.

Plot 2. Having 14 tons of farmyard manure each year.

Plots 7, 8, and 9. Manured respectively with different artificial mixtures, the same being applied to the same plot each year; the mean result of the three plots being taken to represent the produce by artificial manure.

The mean result, each year, of these three widely-different and characteristic conditions—without manure, with farmyard manure, and with artificial manure—is taken to represent the average produce for the year. The particulars given are—the actual bushels per acre; the bushels per acre reckoned at the uniform weight of 61 lbs. per bushel; the weight per bushel; and the proportion of corn to 100 of straw.

We shall refer in some detail, further on, to the question of the probable average yield of wheat per acre in the three main divisions of the United Kingdom; but we may here observe in passing, that Mr. Caird * estimates the average yield in England at the present time to be 28 bushels. The coincidence with this figure of the results obtained on the selected plots in the experimental field, as recorded in the Table, is sufficiently remarkable. Thus, if we take the column of *actual* bushels per acre, we have, taking the average of the 16 years, 1852-67, $28\frac{7}{8}$ bushels; or if we take the average of 17 years (that is,

* 'Our Daily Food,' &c., p. 12.

…TED EXPERIMENTAL FIELD.

Mean of Plot …ummary of the published Opinions of various Authorities on

YEAR.	… AUTHORITIES. … "M. L."—*Mark Lane Express.* "F. M."—*Farmer's Magazine.* … "L."—*J. B. Lawes* (Letters to *The Times*).
1852	…good promise but ripened prematurely, harvest unfavourable and tedious; little …ng, damp harvest, yield reduced, quality much damaged, foreign needed for mixing; … bulk, but much blighted, mildewed, and grown; considerably below average.
1853	…low average. M. L.—Area very small, unpromising, crop very short and inferior …rvest late, total ⅓ below average; bad crop in France; last crop, and potatoes help; …. & G.—Bad seed time, much reduced area, crop worse than for many years past.
1854	…ually productive, best since 1844. M. L.—Land favourable, area very large, over …ld very large and very fine; imports limited, but much Indian corn; work slack, …time, variable season, late harvest, but largest crop for many years past.
1855	…well, crop nearly average. F. M.—Still larger area, promised well, harvest slow, …moderate, scarcity abroad, prices high, consumption reduced; potatoes abundant. … various.
1856	…uantity but not quality, yield various, red better than white, much early thrashed. …ition; large imports from both Baltic and America; demand for the Continent.
1857	…. F. M.—Full, or over average area, fine promise throughout, harvest 3 weeks … imports generally large, stocks heavy throughout, harvest 1858 early, and much
1858	…e, favourable harvest, fair quantity, good quality, stocks large at harvest 1858, and …d light, about average quantity, more than 1855 or 1856, and quality better, straw …e; very early, good harvest; crops above average, though by no means equal 1857.
1859	…ient, low weight, much old at harvest 1859; Dec., 130 average, 112 under, 15 over … 1858, very much straw; imports only moderate; towards harvest 1860 not much …rops much injured; considerable bulk, but yield below average and quality inferior.
1860	… well, and much damaged since. M. L.—Full average area, backward in spring, … very bad, mixture required for grinding; imports large throughout, yet small … large, but new will be required early. L. & G.—Unusually wet, stormy, and
1861	…, early condition poor, yield deficient, quality good. F. M.—Deficient area; winter …y good; imports large from America and Baltic, prices declined; at harvest 1862 …good quality.
1862	…ually large area in England, Scotland, and Ireland; progress promising, then …nd with home; harvest 1863 three weeks early; 1862 crops nearly exhausted;
1863	… M. L.—Less area than last, good promise throughout, enormous produce, fine …p known, quality seldom equalled; imports generally only moderate, and foreign …uch above average, both quantity and quality; best yield for many years.
1864	…ast. M. L.—Average area, fair promise, quality fine, stocks very large. F. M.— …e than expected, quality fine; imports small, much of 1863 still left, stocks large, …Good soils much above, poor below average quantity; quality above average.
1865	…re = 4 below average, only good clays over average. M. L.—Came up well, good … middling condition. F. M.—Early progress generally favourable, quantity fair …uch old left, new soon in market; early imports moderate, stock in France large; …ge quantity, quality moderate.
1866	…bly below 1865, much damaged, but good yield. SAUNDERSON (*Times*).—Slow …harvest, fair quantity, when new required mixture. F. M.—Early promise good, … Dec. to Feb., little from America, foreign accumulating, home early reduced, …*es*, Oct. 10)—Quantity 10 to 12 per cent. deficient, quality above average.
1867	… quality. *Bell's Messenger*—Yield very deficient, quality inferior. AGRICULTURIST …g quality; (Sept.)—Universally admitted to be very deficient. F. M.—Winter … condition, very little old left, prices high; large arrivals, much will be wanted. …old left.
1868	…od wheat soils; 126 over, 13 under, 67 average. SAUNDERSON (*Times*, Aug. 13).— …and condition, probably never equalled on good soils; shallow soils disappointing. … yield ⅙ over 1867. L. (*Times*, Aug. 17.)—Area over average, quantity probably
Aver. 16 yrs., 1852-67.	
Aver. 17 yrs., 1852-68	

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including the high produce of 1868) 29⅛ bushels. If, on the other hand, we take the column showing the number of bushels per acre of 61 lbs. per bushel, the correspondence is still closer. Thus, taking the average of the 16 years, we have 28⅛ bushels; or, taking the average of the 17 years (including 1868), 28½ bushels.

It is also remarkable that although the variation in the weight per bushel from year to year has been so great as in several cases to show a difference of from 10 to 20 per cent. between the actual number of bushels measured and the number if reckoned at 61 lbs. per bushel, yet, taking the average of the 16 or the 17 years, there is a difference of little more than half a bushel, whether the actual measure, or the measure reckoned at 61 lbs. per bushel, be adopted. It need hardly be said that the measure reckoning 61 lbs. per bushel is by far the better indication both of actual and of relative quantity.

A comparison of the figures in the Table with the briefly-summarised statements from various sources given opposite to them also shows a very general accordance. Thus, 1863, 1854, and 1857 are shown to have been the most productive in the experimental field, and they are admitted by general consent to have been years of very great abundance in the country at large. 1853, 1860, and 1867, on the other hand, gave very deficient crops in the experimental field, and are generally admitted to have been years of great deficiency throughout the country. The figures show the harvest of 1853 to have been not only extremely bad, but the worst on our list; and it is spoken of as having yielded the shortest crop within the generation—indeed, the worst since 1816. Owing to the wet condition of the land, much that had been intended for wheat was not sown with it at all; and much land throughout the country, as was the case in experimental field, was not sown until the spring. Still we do not for a moment assume that the crop of 1853 was, in the country generally, at all relatively so deficient as was our own spring-sown and, in every respect, very exceptionally bad crop.

Again, 1855 is spoken of as scarcely average, and 1856 as about the same, or perhaps rather better, and the experimental field indicated (at 61 lbs. per bushel), between 27 and 28 bushels in both cases: rather more, however, in 1856, if reckoned in *actual* bushels measure. A correspondent in 'The Times' estimated the crop of 1855 at 8 bushels per acre less than that of 1854, and this is very nearly the difference indicated by the figures in the Table.

In regard to the harvests of 1862 and 1864, the agreement between the results in the experimental field and the yield of the country according to the recorded opinions, is less marked.

It is probable that, in the country generally, the yield per acre

in 1862 was not more than average, whereas in the experimental field it proved on thrashing to be rather over average. The area under wheat was, however, stated to be unusually large. The imports were also large, and the harvest of 1863 was two to three weeks earlier than usual, and hence the deficient yield per acre in 1862 was comparatively little felt, and little influenced prices.

The crop of 1864, again, was more above the average in the experimental field than, according to the records, in the country generally. But the wheat crop of that year was, relatively, very much better on the heavier than on the lighter soils. It, moreover, followed the enormous crop of 1863, and was very short in the straw; both of which circumstances would be likely to lead to an under-estimate of its amount. Indeed, it was afterwards spoken of as having yielded better than had been expected. The surplus of 1863 no doubt materially influenced prices during the harvest-year 1864-5; yet, considering the circumstances above-mentioned, the comparatively small amount of the imports, and the very low price, it is very probable that the crop of 1864 was in reality considerably better than the published reports represented it to be, and perhaps but little less above the average than was the crop in the experimental field.

Leaving out of consideration for the present the question of the degree of correspondence in the actual amount per acre, it is obvious that there has, in point of fact, been a very general accordance between the fluctuations in the amount of produce from year to year on the selected plots of the experimental field and those in the produce of the country generally in the corresponding seasons. The coincidence is, to say the least, very marked, and much greater than could have been anticipated.

Sources and Character of the Data available.

We will now attempt to apply such data as are at command, to estimate the amount of the home-produce, the foreign supplies, and the consumption of wheat, in England and Wales, in Scotland, and in Ireland, each separately; also in Great Britain, and in the United Kingdom collectively, during the 16 harvest-years 1852-3 to 1867-8 inclusive. It will be necessary, however, first to consider, in some detail, the sources and character of the data available for the purpose; in order that a judgment may be formed of how far the conclusions indicated are really reliable, and how far the course of the inquiry serves to show on what points more comprehensive and exact information is essential before really trustworthy estimates can be made in reference to the questions proposed, involving as they do, considerations of such great national interest and importance.

The subjects to be considered are—the extent of area under wheat; the average yield per acre; the aggregate home-produce, and the amount of it available as human food; the quantities imported; the number of consumers; the consumption per head of the population; also some other points.

1. *Area under Wheat.*

On this very fundamental element of the inquiry the information at command is extremely incomplete. Perhaps the average number of acres under wheat, over a series of years, may be estimated for each of the main divisions of the United Kingdom with approximate accuracy. But a consideration of such records as are available, showing the fluctuations in area from year to year, indicated how desirable it was, if possible, to estimate the variation from the average area each year. This, therefore, was attempted with regard to England, which comprises so large a proportion of the total wheat-growing area of the United Kingdom. After much consideration, however, it was decided that the uncertainty, or deviation from the truth, in regard to the area in individual years, might be equally great, and the average result over a series of years perhaps less to be relied upon, if it were attempted to estimate the area for each individual year, and for each separate division of the kingdom, in an arbitrary manner, on the authority of mere opinions or general statements.

After this explanation of the difficulties which beset the question, and at the same time freely admitting the great need of more complete and reliable data on the point, we may here state generally, that, throughout the calculations, we have estimated the area for the years preceding, intermediate to, or succeeding those for which returns or reliable estimates are available, by the simpler method of either adopting those returns or estimates for the proximate years, or distributing the difference between the figure adopted at one date and that at another, equally from year to year.

For neither England nor Wales have we any official records or estimates, of the area under wheat for any year within the period of our review prior to 1866. We have, however, for England Mr. Caird's estimate for 1850. This, so far as we are aware, is the most reliable information available relating to the period prior to the recent official returns. The approximate accuracy of the estimate is, moreover, rendered the more probable from the fact that it gives a somewhat higher acreage than the recent returns; the general opinion being that the area under wheat has diminished during the last 15 or 20 years.

The whole of our numerical records in regard to the area under wheat in England are, then, as follows:—

		Acres.
For 1850—Mr. Caird's Estimate	.. .. ..	3,416,000
„ 1866—"Agricultural Returns"	.. ..	3,126,431
„ 1867— Do. do.	.. .. ..	3,140,025

Adopting these figures as a basis, we have distributed the difference between the amount estimated for 1850 and that returned for 1866 equally from year to year among the intermediate years.

For Wales the "Agricultural Returns" give us the area for 1866 as 113,862, and for 1867 as 116,733 acres; but we have no information whatever in respect to any other year. We adopt, therefore, the official figure given for 1866 for each of the preceding years.

In Appendix-Table I., p. 392, will be found the estimated area under wheat in England and Wales collectively each year, obtained by the simple addition of the figures adopted for each, as above described.

In regard to Scotland, we have returns of the acreage under wheat in 1854, 1855, 1856, and 1857, collected by the Highland Society*; and for 1866 and 1867, we have the "Agricultural Returns," collected by officers of the Inland Revenue Service, under the auspices of the Statistical Department of the Board of Trade. The results are as follows:—

TABLE II.—AREA UNDER WHEAT IN SCOTLAND.

Years.	Acres.	AUTHORITY.
1854	168,216	Highland Society.
1855	191,301	
1856	263,328	
1857	223,153	
Mean ..	211,500	
1866	110,101	Inland Revenue Officers.
1867	111,118	
Mean ..	110,610	

* 'Agricultural Statistics of Scotland.' Report by the Highland and Agricultural Society of Scotland to the Board of Trade.

It is generally admitted that of late years, in Scotland, the breadth under wheat has considerably diminished, and that under barley and oats increased. But, according to the figures in the Table, we have within the period of the four consecutive years for which returns are given by the Highland Society, a variation in the proportion of about two to three; and taking the mean of the four years 1854, 1855, 1856, and 1857, we have 211,500 acres, against a mean of only 110,610 as returned for 1866 and 1867 by the Inland Revenue Department. Here, then, is indicated a reduction of the area under wheat in Scotland by nearly one-half between the two periods, separated by an interval of only eight years.

Such wide differences with actual returns seem to leave us in as great uncertainty as when we have to rely upon carefully-considered occasional estimates merely. It is possible that part at least of the deficiency of area returned by the Highland Society, in the first two years of their record, may be due to defective machinery of collection in the earlier years of their inquiry; and it is, perhaps, more than probable, that the returns for 1866 and 1867 are lower than they should be, on account of the suspicion entertained by the occupiers, of the object of returns collected by the officers of the Inland Revenue Department. Such, however, are the best data at command relating to the area under wheat in Scotland.

For each of the two years prior to the date to which the Highland Society's first return refers, we have, for want of any recorded information on the subject, taken the mean of their four yearly returns; and for the years intermediate between the two sets of returns, we have distributed the difference between the mean of the results collected by the Highland Society and the mean of the more recent returns by the Inland Revenue officers, equally from year to year. The figures so obtained will be found in the proper column in Appendix-Table II., p. 393.

We have for Ireland a return of the number of acres under wheat, in each individual year to which our inquiry relates.* The figures are given in Appendix-Table IV., p. 395. It will be well, however, briefly to call attention here to the wide range of fluctuation of area under the crop during the 16 years, 1852-1867, which these figures relating to Ireland indicate. The following statement brings to view the most striking points:—

First Year	1852	353,566 acres.
Last Year	1867	261,034 „
Maximum Area	1857	559,646 „
Minimum Area	1863	260,311 „
Mean, 16 Years ..	1852—1867	389,084 „

* 'Agricultural Statistics, Ireland.' 1868.

Thus, the area in the first year, 1852, was less than the mean area of the sixteen years; but it was one-third more than in the last year, 1867. The maximum area was in 1857, and it was more than double the minimum, which was in 1863, only six years later.

The fluctuation of area under wheat in Ireland, during the last 16 years, has, therefore, according to the returns, been very great indeed; and it has doubtless, in reality, been very considerable. The general result indicated is, a marked increase of area from 1852 to 1856, and a pretty uniform and very large area in 1856, 1857, and 1858; then a marked diminution to the minimum point in 1863, and from that time to the present comparatively little change. One element in the explanation of these changes doubtless is, that, during the earlier years, the increase of area was encouraged by a more than average yield per acre. The yield was then only about average during the years of very large area, and it then fell gradually to a very low point in 1862. After this the yield per acre again improved, but the area has not in a corresponding degree been enlarged.

For the Isle of Man, and the Channel Islands, the "Agricultural Returns" give us the area under wheat in 1866 and 1867. But the area and the population of these islands constitute but a fraction of 1 per cent. of the area and population respectively, of the United Kingdom. Nor does the Registrar-General in his estimates of the population of the United Kingdom include the population either of these or of the other islands in the British Seas. Upon the whole we considered it of very questionable utility to take either the area or the consumption of these islands into consideration, and we have therefore disregarded them in the calculations.

We have now described the sources and character of the data at command for the purpose, and adopted returns, or estimates, as the case may be, of the area under wheat, in England and Wales, in Scotland, and in Ireland, in each year from 1852 to 1867 inclusive. The area for Great Britain, and for the United Kingdom, can obviously be estimated by simple addition of the proper items so determined. Accordingly, in Appendix-Table III., p. 394, for Great Britain, and in Appendix-Table V., p. 396, for the United Kingdom, the results of such calculations are given.

2. *Yield of Wheat per Acre.*

It will be obvious that a knowledge of the average yield of wheat per acre, from year to year, is as important an element in estimating the home-produce of the country as is that of the

number of acres under the crop. Yet, it must be admitted that there is as great a deficiency of authentic data in regard to this point as to that of area. The only returns we possess are for Scotland in 1854, 1855, 1856, and 1857, and for Ireland in regard to each individual year included within the period of our inquiry. For England and Wales, which, taking the average of a series of years, probably comprise more than 85 per cent. of the total area under wheat in the United Kingdom, there are no returns whatever.

The average produce of wheat per acre is estimated by various authorities at amounts chiefly ranging from 28 to 32 bushels; some, however, go below 28, and others higher than 32. Perhaps the most generally assumed average is 30 bushels. As already referred to, Mr. Caird * estimated the average yield per acre, in 1850, at not more than 26½ bushels; and he concludes that, at the present time, it does not exceed 28 bushels. We have ourselves always doubted the trustworthiness of the more sanguine estimates.

Granting then, that, for England and Wales, comprising about 8½ tenths of the whole wheat-growing area of the country, we have no official data whatever upon which to found an estimate of the yield per acre from year to year, the question arises—How are we to attempt to form such an estimate?

It is freely admitted that the character of the data we have to fall back upon is, *à priori*, anything but satisfactory. Nevertheless, it is believed that, in the absence of actual records on the point, the most reliable estimates available may, with proper care and reservation, be founded on the amounts of produce per acre obtained from year to year on certain selected plots (as already referred to) in the experimental field at Rothamsted, in which wheat has now been grown for 25 years in succession, and for 17 years with the same condition as to manuring from year to year on the respective plots.

It has already been shown that the fluctuations in the average results obtained on the selected plots from year to year, have, in the main, remarkably corresponded in general character and direction with the fluctuations in the yield of the crop over the country generally. But in attempting to get an actual figure to represent the average produce of the country each year, it is obviously essential carefully to consider the characteristics of each harvest, both in the experimental wheat-field and over the country generally; and, accordingly, if it should seem desirable, to subject the actual experimental results obtained to modification or correction, before adopting them as measures of the average yield of the country.

* 'Our Daily Food,' &c., p. 12.

There is sufficient evidence that the wheat grown at Rothamsted pretty generally weighs less per bushel than the average of the home-grown wheats sent to the English markets. This is more especially the case with the grain from the field devoted to the growth of wheat year after year; and the deficiency is generally the greater the less favourable the season, and the less the actual weight per bushel. This, so far as the *non*-experimental fields, and the heavily artificially manured plots in the experimental field, are concerned, is, doubtless, partly accounted for by the greater bulk of these crops than that of the average in the country.

Considering these circumstances, and the fact already referred to, which will be further illustrated presently, that a given number of bushels per acre may represent very different amounts or weights of produce, and consequently of flour or bread, according to the weight per bushel of the grain, it was obviously desirable to reduce the actual number of bushels per acre to bushels of a given weight. In the construction of the official returns of the imports and exports of wheat and wheat-flour, the quantities entered in cwts. are reduced to quarters by calculations based on the assumption that foreign wheat averages a little under 61 lbs. per bushel measure. On the other hand, the average weight of home-grown wheat, over a series of years, is probably a little over 61 lbs. per bushel.

The first modification to which the actual results obtained in the experimental field are subjected, before adopting their indications as a measure of the yield in the country generally, is, therefore, to reduce the produce per acre into bushels of the uniform weight of 61 lbs.

Again, as the soil in the experimental field is a somewhat heavy loam, with a subsoil of clay, and chalk below, and is of fair average, though not high wheat growing capability, it is obviously a question whether in the seasons most favourable to the heavier soils, the results may not be rather more favourable than those over the country at large, including the shallower, lighter, and poorer soils. In reference to this point, it is, of course, to be borne in mind not only that it is in such seasons that the better wheat soils will have the advantage, but also that it is upon the yield of these that the average much depends.

The season in which, owing to the circumstances above alluded to, the average yield per acre on the selected plots in the experimental field might, if in any, be supposed to be in excess of the average of the country generally, is 1864, as already referred to. But, as then explained, it is considered pretty certain if there were any excess at all, that it was by no means so great as might be judged by comparison of the amount with the accounts given

of the crop about and immediately after harvest. It has been decided, therefore, not to alter the figure which the experimental results indicate for the average yield per acre in 1864; and even should the estimate be somewhat too high, any small error in that direction will probably be more or less compensated in the calculation of the aggregate produce, inasmuch as the area was said to be over average, whereas in the calculations it has been taken at the average only.

On the other hand, there are two years in reference to which there could not be any doubt that the produce in the experimental field was, even for the seasons, exceptionally bad. These are 1852 and 1853, to the latter of which reference has already been made. For these two years, therefore, we disregard the results in the experimental wheat field altogether, and arrive at an estimate of their average yield per acre as follows:—According to Mr. Caird, the general average of the country, irrespectively of fluctuations due to season, would be about 27 bushels at the dates in question; and, after a careful consideration of the published statements respecting the crops, it is assumed that in 1852 the yield per acre was one-sixth, and in 1853 one-fourth below the average of the period.

With these two exceptions, then, and after reducing in all cases the actual number of bushels to bushels of the uniform weight of 61 lbs., we adopt the results on the selected plots in the experimental field as representing, as nearly as any existing data enables us to estimate it, the average yield of wheat per acre in England and Wales, in each of the sixteen years, 1852-1867 inclusive. The results will be found in the proper column in Appendix-Table I. p. 392.

It will be admitted to be a confirmation of the approximate correctness of the estimates thus arrived at, that, taking the average of the results given for each of the 16 years, we get an average for the whole period of 28¾ bushels as the yield per acre of the country; whilst Mr. Caird's estimate of 26½ bushels for 1850 and 28 bushels at the present time, would give us an average of about 27½ bushels per acre per annum for the whole period. When, moreover, it is borne in mind that we have had during the period perhaps more than an average of favourable seasons, the agreement between the two estimates comes to be nearer than at first sight appears.

For Scotland we have, as already noticed, returns of the number of acres under wheat in 1854, 1855, 1856, and 1857; and having also returns of the aggregate produce of wheat in each of those years, it is obvious that from these data the yield per acre each year can easily be calculated. The figures so obtained are—

	Bushels per Acre.
1854	$28\frac{7}{8}$
1855	$26\frac{1}{2}$
1856	$27\frac{5}{8}$
1857	$27\frac{5}{8}$
Mean	$27\frac{5}{8}$

The fluctuations from year to year here indicated are certainly very small. The average for the four years is nearly 4 bushels less than that of the estimates adopted for England and Wales for the same period; but it is only about 1 bushel less than the average for England and Wales over the 16 years. As this is the case, as we have no records whatever to guide us in reference to any of the other years, and as according to the estimates the average area under wheat in Scotland amounts to less than one-twentieth of the total in the United Kingdom, and to not much more than one-twentieth of that in England and Wales, we adopt, for each of the years for which we have no records the same figure for the average yield of wheat per acre in Scotland as in England and Wales. This, it is true, as the above comparison of the results for the 4 years is sufficient to show, may lead to inconsistencies in individual years. Nevertheless, the method of estimate adopted is the best available; and the figure obtained for the average of the whole period will, probably, be not far from the truth; though, perhaps, slightly too high.

For Ireland we have, for each of the 16 years, 1852-1867, returns of the area, and estimates of the aggregate produce; and from these data the average yield of wheat per acre each year has been calculated. The results are entered in Appendix-Table IV., p. 395.

Below is given the average result over the 16 years for each of the main divisions of the United Kingdom separately, and for the whole collectively. The figures for Great Britain, and for the United Kingdom, are not the mere arithmetical means of those given for each of the separate portions, but they are the calculated averages, having regard to the area under the crop in each separate division:—

Returned or Estimated Average yield of Wheat per acre per annum over 16 years, 1852-1867.

	Bushels.
England and Wales	$28\frac{3}{4}$
Scotland	$27\frac{3}{4}$
Great Britain	$28\frac{5}{8}$
Ireland	$23\frac{7}{8}$
United Kingdom	$28\frac{1}{4}$

Whatever objections may be raised to the method of estimate adopted, or to the results arrived at, in regard to the subject of

average yield of wheat per acre, so far as individual years are concerned, it is nevertheless believed that the figures given above represent the truth as closely as existing information enables us to approach it. Assuming the approximate accuracy of the figures, it is to be observed that England and Wales, comprising about 85 per cent. of the whole area, also give a higher average yield per acre than Scotland, which comprises only about 5 per cent.; and Scotland, in its turn, gives a higher yield than Ireland, comprising about 10 per cent. of the whole area. Indeed, owing to the relatively small area under wheat in Scotland, and in Ireland, the average yield per acre for the United Kingdom is comparatively little below that for England and Wales.

3. *Aggregate Home-produce, and the Amount of it available as Human Food.*

For England and Wales the total home-produce is ascertained by multiplying the adopted number of acres under the crop each year, by the estimated number of bushels (of 61 lbs.) per acre, and then reducing into quarters.

For Scotland the same method of calculation is adopted as for England and Wales, excepting for the four years 1854-57, for which the returns of the Highland Society give the aggregate produce in bushels. These have simply been reduced to quarters, regardless of weight per bushel, which, however, from the columns showing the weight per bushel in each of the very numerous districts, would appear to be on the average notably below 61 lbs.

In the case of Ireland, the "*Agricultural Statistics*" give estimates of the aggregate produce each year in quarters, and we adopt the figures as they stand. They also give estimates, by weight, of the average yield per acre; but it is obvious, on dividing the aggregate produce by the recorded number of acres, and comparing the result with that obtained by dividing the recorded average yield per acre by 61, that the measure is given at a considerably lower weight per bushel than 61 lbs.; lower indeed, than that for Scotland; and doubtless, with the moist climate of Ireland the weight per bushel does in reality average less than in Scotland, and less still than in England and Wales.

Considering the comparatively small proportion of the area under wheat in Scotland and in Ireland to that in the United Kingdom collectively, there will be but an immaterial amount of error due to taking the measure of the aggregate home-produce of those divisions of the kingdom at a lower weight per bushel than 61 lbs.

It will be obvious that the total home-produce, however accu-

rately estimated, does not correctly represent the amount of home-grown wheat available for consumption as flour and bread. A certain amount is each year returned to the land as seed. In estimating the amount of home-grown wheat available for consumption, therefore, we have deducted 2¼ bushels per acre from the estimated total produce. Doubtless less than this is devoted to seed, over a large proportion of the area sown in the United Kingdom; but where drill husbandry is not adopted, the quantity will be more. It will probably be so, more especially in the greater part of Ireland, some portions of Scotland, and in some of the northern counties of England. Considering, however, that the quantity will average less over a large proportion of the chief wheat-growing districts of England, the estimate of 2¼ bushels will probably not be far from the truth.

4. *Imports.*

For the whole period to which our inquiry relates, we have returns either of the net imports of wheat and wheat-flour, or of the imports and exports, from which the net imports can be calculated, for the United Kingdom collectively, and for Ireland* separately. To get the net imports, that is, the imports less exports, for Great Britain, we have obviously only to deduct those for Ireland from those of the United Kingdom.

Unfortunately, although we are thus able to determine from the beginning the net imports into Great Britain, there are no returns for England and Wales, or for Scotland separately, prior to 1862. From that date, however, we have returns of both imports and exports for England and Wales; and from 1865 returns of imports into Scotland. From 1862 to 1865 we have determined the imports for Scotland by deducting those for England and Wales from those for Great Britain; and, since that date, the returns for Scotland are adopted; and these deducted from those for Great Britain, give the results for England and Wales. There is some immaterial discrepancy between the results so obtained and the actual returns for England and Wales, but the plan was adopted to prevent inconsistency with the figures given for Great Britain.

For the ten years preceding 1862, the date of the first separate returns for England and Wales, we are obliged to rely entirely upon our own judgment in the apportionment of the aggregate imports into Great Britain, to England and Wales, and to Scotland, respectively. We have done it as follows:—For the six years commencing 1862, for which we have the separate returns for

* Excepting for 1854, for which we have not been able to procure the returns; and we have therefore adopted for that year the mean of the figures given for 1853 and 1855 respectively.

England and Wales, or Scotland, or both, the average total amount available for consumption per head per annum in Scotland has been calculated, and it is assumed to have been the same in each of the preceding ten years. This figure is multiplied into the number of the population for each year, giving the estimated aggregate consumption, and from this the returned or estimated amount of home-produce is deducted, and the remainder is the quantity which, it is assumed, has been provided by the net imports. The amount of net imports into Scotland each year being so determined, this deducted from the returned amount for Great Britain gives the estimated quantity of net imports into England and Wales for each of the ten years in question.

In all cases, however, the imports are calculated, not for the calendar, but for the harvest-years; that is, from September 1st of one year to August 31st of the next. In the case of the returns for the United Kingdom for the whole period, and of those for England and Wales and Scotland during the last few years, this has been done by the aid of the records for the individual weeks or months. But so far as Ireland is concerned, we have only had access to returns for each separate calendar year; and, in its case, therefore, the imports for the harvest years have been calculated by adding one-third of the imports of one year to two-thirds of those of the next. For example—for the harvest-year 1852-3 (Sept. 1st, 1852—Aug. 31st, 1853), one-third of the recorded imports for 1852, and two-thirds of those for 1853, taken together, are assumed to represent the imports of that harvest-year, and so on.

Exceptional deviations from the above methods of record or estimate are explained in foot-notes to the Appendix-Tables, unless considered quite immaterial.

5. *Population.*

There are official returns, or estimates, of the population at the middle of each year for the whole period of our review—for England and Wales, for Scotland, and for Ireland, each separately, and for the United Kingdom collectively.*

In these records we have quite sufficiently accurate information as to the total number of mouths there are to feed in each separate part of the kingdom, and in the whole collectively, each year. As, however, the figures apply to the middle of each year we have estimated the number required to be fed by the home-produce of each harvest and the imports of the twelve months or harvest-year following (Sept. 1 to Aug. 31), by adding to the

* Twenty-ninth Annual Report of the Registrar-General, &c., &c. (1868), p. lxx.

number recorded for the preceding midsummer two-thirds of the difference between that figure and the number set down for the next midsummer, thus bringing the estimate up to the middle of the harvest-year; that is, to the end of February. For example, the population set down as the consumers from September 1st, 1852, to August 31st, 1853, is calculated by adding to the official estimate for midsummer 1852 two-thirds of the difference between that estimate and the number given for midsummer 1853, and so on.

But in estimating the quantity of wheat required by a given population by reference to the amounts of flour and bread recorded in the dietaries of persons of different classes, sexes, and ages, it is obviously necessary to take into account the number of each description comprised in the total population. It happens, however, that the published records of dietaries do not enable us to go more into detail in the classification of consumers, so far as sex and age are concerned, than is represented by the division into—males under fifteen years, males over fifteen years, females under fifteen years, and females over fifteen years.

The following table shows the proportion of each of the above divisions in 100 of the population of England and Wales, in 1866; and it is only for England and Wales that we have attempted to estimate the consumption per head, according to the entries of bread and flour in published dietaries.

PER CENT. in the TOTAL POPULATION of ENGLAND and WALES (1866).

AGES.	MALES.	FEMALES.	TOTAL.
Under 15 years	18·1	18·0	36·1
Over 15 years	30·4	33·5	63·9
Totals	48·5	51·5	100·0

6. *Estimated Consumption of Wheat per Head of the Population per Annum.*

In 1855 * we published estimates of the average amounts of certain constituents of food consumed in 24 hours by individuals of both sexes and different ages. The results were obtained by the calculation of 86 different dietaries, arranged in 15 divisions, according to sex, age, activity of mode of life, and other circumstances. It was obvious that the data were applicable for arriving at some conclusion as to the amount of the products

* 'On the Sewage of London,' Journal Society of Arts, March 9, 1855.

of wheat grain—flour and bread—consumed by each individual of the population.

The average amount of wheat consumed per head of the population, per annum, had been variously estimated at from 6 to 8 bushels for the whole of Great Britain.* According to the amounts of bread and flour registered in the dietaries selected for the calculation, we were led, at the date referred to, to conclude that not more than from 6½ to 6¾ bushels of wheat were consumed per head of the population in England. On reconsideration, with a view to this paper, of the data adopted, and of the calculations then made, we are disposed to conclude that the evidence supplied by the dietaries then consulted indicates an average consumption of wheat per head, of the mixed population of both sexes and all ages, of under rather than over 6 bushels per annum.

The records of dietaries, even now at command, are by no means so satisfactory as might be desired, as a basis for the calculation of the consumption of wheat by an average individual of the population. But, on a careful consideration of the more recent data, and a comparison with the old, the result so indicated is that the consumption of wheat in England and Wales is over, but not much over, 6 bushels per head per annum. Against this estimate founded on dietaries, there will be found in detail in Appendix-Table I. (p. 392), and in summary below, the results arrived at on the basis of the population, and of the amounts of the home-produce and the net imports of wheat each year.

For Scotland and Ireland each separately, as well as for Great Britain and the United Kingdom, the average consumption of wheat per head can only be estimated on the basis of the population and the amounts of the home and foreign supplies. The results of all the estimates so made will be found in the respective Appendix-Tables; but the following is a summary of them:—

ESTIMATED CONSUMPTION of WHEAT per Head, per Annum.

	ENGLAND AND WALES.	SCOTLAND.	GREAT BRITAIN.	IRELAND.	UNITED KINGDOM.
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
First 8 years, 1852–53 to 1859–60	5·9	4·2†	5·7	2·7	5·1
Second 8 years, 1860–61 to 1867–68	6·3	4·2	6·0	3·3	5·5
Sixteen years, 1852–53 to 1867–8	6·1	4·2	5·9	3·0	5·3

* Porter's 'Progress of the Nation,' 1851.

† Assumed, according to the average of the 6 years, 1862–63 to 1867–68, for which returns of the separate imports into Scotland are available.

We have now explained in detail the nature of the data at command in relation to—the area under wheat; the average yield per acre; the aggregate home-produce, and the amount of it available for consumption; the quantities imported; the number of consumers; the probable amount required, or the amount available, per head—in each main division of the United Kingdom, and in the whole collectively.

The result is that, unless we except Ireland, we have, neither in reference to the separate portions, nor to the whole of the United Kingdom, the necessary data relating to all the various elements of the question. Such, however, is the best material at our command; and should some of the results, to which the application of it leads, betray obvious inconsistencies, we shall at least have succeeded in adding one more argument to the many hitherto adduced in favour of the official collection and publication of complete agricultural statistics.

7. *General Considerations.*

The following considerations will show how impossible it is, without accurate information on points in reference to which we do not possess it, to determine accurately, either the amount of wheat available, or the amount actually consumed, within the limits of any individual year.

However correctly the average area under wheat over a series of years may be estimated for either, or for all of the main divisions of the kingdom, the breadth is known to vary very considerably from year to year, according to price, stocks of home and foreign wheat, prospect of foreign supplies, and the characters of the season and consequent condition of the land at the time for sowing. Thus, it is known that the area was unusually small in 1853; and it was reported to be deficient in 1861, and more or less over the average in 1852, 1854, 1855, 1856, 1857, 1862, 1863, and 1864; whilst, owing both to the favourable character of the seed time, and the high price of wheat, the area of the crop just harvested (1868) was, it is believed, very large. But of the actual or numerical result of all the above influences, upon which so materially depends the accuracy of any estimates of the home-produce in any particular year, we have had absolutely no information whatever in regard to England and Wales prior to 1866, very incomplete records in regard to Scotland, but much more complete so far as Ireland, about one-tenth of the whole, is concerned.

With regard to the *average yield of wheat per acre* in any individual year, there is, so far as England and Wales and Scotland are concerned, even less to rely upon in the way of *actual record*, than in regard to area.

The *harvest-year*, which is the period of consumption to be provided for, may be several weeks shorter or longer, according to the earliness or the lateness of the two consecutive harvests. The season just past is a striking illustration of this.

The stocks of home-produce in the stack-yard and the barn, and of foreign wheat in the granaries, is very different at one harvest period and at another. The amount carried over for consumption from one harvest-year to another will, therefore, vary very much accordingly. The quantity held over by the farmer will, other things being equal, be at a maximum when ths prices of grain are low, and two or more good harvests succeed each other. It was estimated that at the harvest of 1865 there still remained over from the extraordinary crop of 1863, and the abundant crop of 1864, wheat equal to from one-third to one-half of an average crop; and even at the harvest of 1866 some of the crop of 1863 remained unthrashed.

On the other hand, when wheat is kept for two or three years, a considerable, but an unascertainable, loss results from destruction by vermin.

The *weight per bushel of the grain* will very materially affect the amount of human food provided in a given measure of it. Thus, not to take extreme ranges, a quarter of wheat at the adopted average of 61 lbs. per bushel, will weigh 488 lbs. But if the bushel weigh only 59 lbs, the quarter will weigh only 472 lbs.; or if the bushel weigh 63 lbs. the quarter will weigh 504 lbs. There is here, then, a difference in the weight of a quarter of wheat of 16 lbs., or about $3\frac{1}{3}$ per cent. below the average if the weight per bushel be only 59 lbs., or of 16 lbs., or about $3\frac{1}{3}$ per cent. over the average if the bushel weigh 63 lbs.; obviously, therefore, a difference of 32 lbs. per quarter, or nearly 7 per cent., between a crop of 59 lbs. and one of 63 lbs. per bushel. To illustrate the point in another way: if the average produce for the year were 28 bushels per acre, and the weight per bushel only 59 lbs., it would only yield about as much flour as 27 bushels of the average weight of 61 lbs.; but if the weight per bushel were 63 lbs., the crop of 28 bushels would yield about as much flour as 29 bushels at the average of 61 lbs. per bushel.

Not only will there be a considerable difference in the amount of wheat to grind in a given measure of it, according to the weight per bushel, but there will, generally, be not only a lower percentage of flour, but flour of a lower quality, from the wheat of the lower weight per bushel. Then, again, the lower the quality of the wheat the more, probably, will be dressed out and used for other purposes than human food.

When, on the other hand, the supplies are large, and prices

consequently low, a larger proportion of the inferior samples of wheat will be given to the animals on the farm.

Lastly, the consumption per head of the population will vary, not only according to the amount of employment, and to the price of wheat itself, but to that of other consumable articles. If other food-stuffs are cheap a low price of wheat may but little increase its consumption; but if other articles are dear a relatively low price of wheat will increase its consumption. Again, if both wheat and other articles are dear, it may be a question whether the consumption of the first necessary of life—*bread*—will not be increased rather than diminished, to compensate for the necessary abstinence from, or limitation in the use of, the less absolutely essential food-stuffs.

The above considerations are sufficient to show that, even if we had complete and reliable information as to the area under wheat, the yield per acre, the imports, and the population each year, there are still other elements in regard to which information would be required, before really trustworthy conclusions could be formed on some important points. Thus, as will be seen presently, the inadequacy of the data in regard to individual years is well illustrated by the great difference which the results of the calculations, as they stand, would indicate in the amount of wheat consumed per head in one year compared with another.

The Results.

The following Table brings together some of the results distributed in the several Appendix-Tables in regard to the number of bushels *available* for consumption per head of the population, in each main division of the United Kingdom, and in the whole together, within each harvest-year. It also shows the proportion per cent. in which the *available* supply was due to home and foreign sources respectively.

Obviously, from the various causes which have been enumerated, the figures can only show the quantities *available* each year, as represented by the estimated yield of one harvest and the imports up to the next harvest, and *not* the amounts actually consumed within the limits of each harvest-year.

Taking our illustrations on the point from the figures relating to England and Wales, it is obvious, if we assume 6·1 bushels of wheat per head per annum to represent the average consumption, that in the two harvest-years 1852-3 and 1853-4, either the total produce must have been greater than estimated, or the supplies held over from the immediately preceding years must have been considerable, or the rate of consumption at that

TABLE. III.—ESTIMATED QUANTITY of WHEAT *available* per head of the POPULATION, within each Harvest-year; (September 1—August 31).

	England and Wales.			Scotland.			Great Britain.			Ireland.			United Kingdom.		
	Total per head	Per Cent. From Home-produce.	Per Cent. From Imports.	Total per head.	Per Cent. From Home-produce.	Per Cent. From Imports.	Total per head.	Per Cent. From Home-produce.	Per Cent. From Imports.	Total per head.	Per Cent. From Home-produce.	Per Cent. From Imports.	Total per head.	Per Cent. From Home-produce.	Per Cent. From Imports.
	Bushels.			Bushels.			Bushels.			Bushels.			Bushels.		
1852–3	5·7	68	32		36	64	5·4	65	35	2·4	58	42	4·7	64	36
1853–4	5·3	64	36		31	69	5·2	60	40	2·1	67	33	4·5	60	40
1854–5	6·8	91	9		36	64	6·5	86	14	2·4	71	29	5·6	84	16
1855–6	5·3	87	13		38	62	5·2	81	19	2·6	73	27	4·6	80	20
1856–7	5·7	79	21	*4·2	52	48	5·5	76	24	2·6	77	23	4·9	75	25
1857–8	7·5	76	24		45	55	7·1	73	27	2·8	71	29	6·2	74	26
1858–9	6·3	82	18		48	52	6·1	79	21	3·5	63	37	5·5	76	24
1859–60	5·0	82	18		36	64	4·9	76	24	3·5	51	49	4·6	72	28
1860–1	6·3	52	48		29	71	6·1	51	49	3·4	47	53	5·6	50	50
1861–2	6·4	61	39		31	69	6·1	59	41	3·5	29	71	5·6	55	45
1862–3	7·1	65	35	4·4	32	68	6·7	63	37	3·2	25	75	6·0	58	42
1863–4	7·6	78	22	4·6	37	63	7·2	75	25	3·3	33	67	6·5	71	29
1864–5	6·4	83	17	3·9	36	64	6·1	79	21	3·3	33	67	5·6	73	27
1865–6	6·1	72	28	4·9	22	78	5·9	68	32	3·2	34	66	5·4	65	35
1866–7	5·4	65	35	3·4	24	76	5·2	61	39	3·2	31	69	4·8	58	42
1867–8	5·1	55	45	4·0	18	82	5·0	52	48	3·2	28	72	4·7	49	51
Mean	6·1	73	27	4·2	34	66	5·9	69	31	3·0	49	51	5·3	67	33

* Assumed, according to the average of the 6 years, 1862–63 to 1867–68, for which returns of the separate imports into Scotland are available.

period must have been considerably below the average of the sixteen years According to published reports, a good deal of the crop of 1849 remained at the harvest of 1850; whilst the imports were very large, and foreign wheat had accumulated up to the harvest of 1851, though the home-produce was said to be closely used up. The reports would show, however, that stocks of both home and foreign wheat were, perhaps, more than usually small at the harvest of 1852. Most probably the consumption per head was lower at that date; but we must confess to the want of sufficient information to enable us to decide upon the exact explanation of the facts.

With regard to none of the other years is there any difficulty in showing how the estimated average requirement for the period could be met; but rather, on the contrary, during some of the later years, the figures indicate a surplus which the mere average consumption would not dispose of.

Thus, the two deficient years of 1855-6 and 1856-7 stand between the abundant harvest of 1854, and the both early and abundant one of 1857. Again, the deficiency of the harvest-year 1859-60, appears to be compensated by the surplus of the two preceding years. Lastly, the deficiency within the harvest-years of 1866-7 and 1867-8, is, apparently, more than compensated by the surplus available for carrying on from year to year since 1861-2. Indeed, according to the figures, we ought at the present time, to have considerable stocks of either home or foreign wheat on hand. There is, however, no reason to suppose that such exist. So far as the harvest-year just past (1867-8) is concerned, the high prices are sufficient to show that there was throughout a less than average supply; but it must not be forgotten that the period of consumption has been considerably shortened both by the somewhat late harvests of 1867, and the very unusually early one of 1868; and hence the figure representing the total quantity available per head has in reality had to meet the requirements of considerably less than the assumed period of twelve months.

The great fluctuation in the proportion in which the home supplies provide the amount required of the staple food of the population from year to year, chiefly due to season, but partly also to variation in area, and partly to gradual increase in population, is strikingly illustrated by the figures given in Table III.; but more strikingly still by those in Table IV., below; which shows the proportion in which the estimated produce of wheat of each harvest provided the amount required during the succeeding harvest-year, supposing the amount per head required in each individual year to be represented by the average amount per head per annum over the sixteen years.

TABLE IV.—PROPORTION supplied by the estimated Home-produce each Year, in 100 of the estimated AVERAGE requirement per Head of the Population.

HARVEST YEARS.	ENGLAND AND WALES.	SCOTLAND.	GREAT BRITAIN.	IRELAND.	UNITED KINGDOM.
1852–3	64	36	59	47	57
1853–4	56	31	53	47	51
1854–5	102	36	95	57	89
1855–6	75	38	71	64	70
1856–7	74	52	71	67	70
1857–8	93	45	88	67	87
1858–9	85	48	81	74	79
1859–60	67	36	63	60	62
1860–1	54	29	53	54	53
1861–2	64	31	61	34	58
1862–3	75	33	71	27	66
1863–4	97	40	92	37	87
1864–5	87	33	81	37	77
1865–6	72	26	68	37	66
1866–7	57	19	54	34	53
1867–8	46	17	44	30	43
Mean	73	34	69	49	67

Thus, according to the estimates, the home-produce in England and Wales was in 1854 fully equal, in 1863 nearly, and in 1857, not far short of, the estimated average requirements of their populations. In 1853, in 1860, and in 1866, on the other hand, little more than half, and in 1867 even less than half of the wheat required by the population of England and Wales was home-produced.

The figures relating to the United Kingdom collectively, show contrasts nearly, though not quite as great; and it is to be borne in mind that it is in relation to the whole kingdom that the indications are of the greatest interest and importance. In 1854, 1857, and 1863, the home-produce of the United Kingdom supplied, according to the estimates, from 87 to 89 per cent. of the average amount of wheat required by the total population; but in 1867 only 43 per cent., and in 1852, 1853, 1860, 1861, and 1866, only between 50 and 60 per cent.

In reference to the figures in the Tables (III and IV), and to the above comments upon them, the great increase in the number of consumers within the period must not be overlooked. Thus, although the crop of 1863 is estimated to have been considerably greater than that of 1854, it does not, owing to the increase of population during the nine years, supply so large a proportion of the wheat estimated to be required, as does the smaller crop with the smaller population nine years previously.

The fluctuations due to season alone, apart from change of

area or increase of population, is better shown by reference to the estimated yield per acre. The column of estimated average yield per acre each year in England and Wales (Appendix-Table I., p. 392) will well illustrate the extent of this variation. Thus the average yield per acre is estimated at only $20\frac{1}{4}$ bushels in 1853, and at $39\frac{3}{4}$ bushels in 1863. That is to say, there was a difference in the estimated yield per acre in the two years of $19\frac{1}{2}$ bushels, equal to nearly $2\frac{1}{2}$ quarters, or about two-thirds of an average crop, due to variation of season alone. The average yield over the 16 years was $28\frac{3}{4}$ bushels; it results, therefore, that the crop of 1853 was $8\frac{1}{2}$ bushels below, and that of 1863 11 bushels above the average. The result is, that whilst a very bad season may yield only about, or even less than, half of the total wheat required by the population for a year's consumption, an average crop has (according to the population at the time) provided from two-thirds to three-fourths, and an extremely good one not much short of the whole required. A consideration of these facts is sufficient to show the vast importance, at once to the producer, the importer, and the consumer, of correct and early information as to the quantity and quality of the crop of the country.

So much for the proportion, and especially the variation in the proportion from year to year, according to season, increase of population, and other circumstances, in which the home-produce of wheat supplies the estimated average amount required. There remains to be considered the equally important complementary element of the question—what proportion of the wheat consumed is obtained from foreign sources?

Taking the average of the whole period, the percentage of the total wheat consumed which is provided by imports is, of course, the difference between that supplied by the home-produce and 100. But, inasmuch as the sum of the home-produce and the imports of the harvest-year is sometimes more and sometimes less than the average amount required, it is obvious that the difference between the *average* total amount required taken as 100, and the proportion of it which is *available* each year from home supplies (as shown in Table IV.) does not show the proportion actually supplied from foreign sources within each individual year.

The following Table shows the proportion in which the actual imports within each harvest-year provided the estimated *average* amount consumed per head of the population. The imports being much more of a hand-to-mouth supply than the home-produce, they may be supposed to be much more nearly consumed within the period for which they are set down; and consequently the figures in the following Table relating to the imports will so much the more closely represent the actual dependence on imports in each

individual year, than do the figures in Table IV. show the percentage in which the requirements of consumption were actually met by the home-supplies within each year:—

TABLE V.—PROPORTION supplied by the Imports each Year in 100 of the estimated AVERAGE requirement per Head of the Population.

Harvest Years.	England and Wales.	Scotland.	Great Britain.	Ireland.	United Kingdom.
1852–3	30	64	32	33	32
1853–4	31	69	36	23	34
1854–5	10	64	15	23	17
1855–6	11	62	17	23	17
1856–7	20	48	22	19	23
1857–8	30	55	32	26	30
1858–9	18	52	22	43	25
1859–60	15	64	20	56	25
1860-1	49	71	51	59	53
1861–2	41	69	42	83	47
1862–3	41	71	42	79	47
1863–4	28	69	31	73	36
1864–5	18	60	22	73	28
1865–6	28	90	32	69	36
1866–7	31	62	34	73	38
1867–8	38	79	41	76	45
Mean	27	66	31	51	33

Looking for our illustrations to the column relating to the United Kingdom, in relation to which the subject is of the greatest national importance, it is seen that in 1854-5 and 1855-6 the imports supplied only 17 per cent. of the estimated average annual requirements for the population of the period; whilst, in 1860-61 they supplied 53 per cent., in 1861-2 and 1862-3 47 per cent., and in 1867-8 45 per cent.

The average amount of wheat supplied by imports to the United Kingdom over the whole period of sixteen years is 33 per cent. of the total amount estimated to have been consumed. It is a significant fact that only once during the first eight years of the sixteen was more than this average proportion provided by imports, and that was after the exceptionally bad harvest of 1853; notwithstanding which, only 1 per cent. more, or only 34 per cent. of the total for the period (taken at the average rate per head), was imported. On the other hand, only once during the last eight of the sixteen years were the imports below the average proportion of 33 per cent. of the total estimated to be required; whilst in four out of the other seven they exceeded the average proportion by from one-third to one-half or more. This is the case in spite of the fact of a somewhat higher yield per acre during the last than during the first

eight years. Nor can it be accounted for by the degree in which it is assumed that the area under wheat has diminished of late years. It is without doubt to a great extent due to increase of population; but if the estimates are to be relied upon, there has also been an appreciable increase in the consumption of wheat per head of late years; as will be seen by reference to the summary of the results on this head given at p. 377.

To conclude:—In reference to the results recorded in Table V., it may be observed that, whilst taking the average of the sixteen years the imports of wheat to the United Kingdom collectively, supplied only 33 per cent. of the whole required; 51 per cent. of the estimated consumption in Ireland over the same period, and only 31 per cent. of that in Great Britain, were supplied by imports. In each division of the country, however, the proportion of the whole consumed has considerably exceeded the average during the later years, and this is more especially the case so far as Ireland is concerned.

Summary and General Conclusions.

Whatever anomalies may appear on consideration of the results to which our data lead us in regard to individual years, little doubt need be entertained as to the approximate correctness and the value of the average results over the sixteen years, or even over the first eight and the second eight years of the period, so far as most, if not all, of the main points—whether relating to home-produce, imports, or consumption—are concerned.

The following Table (VI.) brings together at one view the average results relating to each of the separate points of the inquiry, for the first half, the second half, and the total period of sixteen years.

It would lead into far too long a discussion were we to attempt to direct attention in detail to the many points of interest brought to view in the above very comprehensive Summary Table. However interesting in certain points of view the average results over the whole sixteen years may be, it is obvious that the real interest centres, so far as most of the subjects are concerned, much more in the direction and the degree of progress from time to time. Leaving the reader to study the evidence of progress from year to year in the Appendix-Tables, it must suffice here to comment on some of the most prominent points which a comparison of the results during the first half and the second half of the period of sixteen years illustrates.

Enough has been said already in regard to the sources and the character of the data upon which the calculations are founded, to indicate on what points the results must, with some reservation, be accepted. With this precautionary observation we may pro-

TABLE VI.—SUMMARY of RESULTS relating to HOME-PRODUCE, IMPORTS, and CONSUMPTION of WHEAT.

Periods.		Estimated Home-produce.			Available for Consumption.			Population (middle of Harvest-Years).	Available for Consumption.					Average Price per Quarter.
									Per Head.			Per Cent.		
		Area under Wheat.	Average Yield per Acre.	Total Home-produce.	Home-produce, less 2¼ Bushels per Acre for Seed.	Imports, less Exports.	Total.		From Home-produce.	From Imports.	Total.	From Home-produce.	From Imports.	
ENGLAND AND WALES.														
		Acres.	Bushels.	Quarters.	Quarters.	Quarters.	Quarters.		Bushels	Bushels.	Bushels,			s. d.
Average per Annum.	First 8 Years, 1852-3 to 1859-60	3,430,322	28⅜	12,154,941	11,190,163	3,010,587	14,200,750	19,079,935	4·7	1·2	5·9	79	21	57 7
	Second 8 Years, 1860-1 to 1867-8	3,289,858	29	11,942,665	11,017,392	5,368,887	16,386,279	20,809,982	4·2	2·1	6·3	66	34	52 4
	16 Years, 1852-3 to 1867-8	3,360,090	28¾	12,048,803	11,103,777	4,189,737	15,293,514	19,944,958	4·4	1·7	6·1	73	27	55 0
SCOTLAND.														
Average per Annum.	First 8 Years, 1852-3 to 1859-60	207,169	26⅜	684,721	626,455	946,135	1,572,590	2,995,410	1·7	2·5	4·2	40	60	. .
	Second 8 Years, 1860-1 to 1867-8	139,655	29	506,765	467,487	1,173,297	1,640,784	3,121,821	1·2	3·0	4·2	29	71	. .
	16 Years, 1852-3 to 1867-8	173,412	27½	595,743	546,971	1,059,716	1,606,687	3,058,616	1·4	2·8	4·2	34	66	. .
GREAT BRITAIN.														
Average per Annum.	First 8 Years, 1852-3 to 1859-60	3,637,491	28¼	12,839,662	11,816,618	3,956,722	15,773,340	22,075,345	4·3	1·4	5·7	75	25	. .
	Second 8 Years, 1860-1 to 1867-8	3,429,513	29	12,449,430	11,484,879	6,542,184	18,027,063	23,931,803	3·8	2·2	6·0	64	36	. .
	16 Years, 1852-3 to 1867-8	3,533,502	28⅝	12,644,546	11,650,748	5,249,453	16,900,201	23,003,574	4·1	1·8	5·9	69	31	. .
IRELAND.														
Average per Annum.	First 8 Years, 1852-3 to 1859-60	454,669	26⅛	1,471,117	1,343,241	696,062	2,039,303	5,991,825	1·8	0·9	2·7	66	34	. .
	Second 8 Years, 1860-1 to 1867-8	323,498	21¼	859,817	768,833	1,555,576	2,324,409	5,674,659	1·1	2·2	3·3	33	67	. .
	16 Years, 1852-3 to 1867-8	389,084	23⅞	1,165,467	1,056,037	1,125,819	2,181,856	5,833,242	1·4	1·6	3·0	49	51	. .
UNITED KINGDOM.														
Average per Annum.	First 8 Years, 1852-3 to 1859-60	4,092,160	28	14,310,779	13,159,859	4,652,784	17,812,643	28,067,170	3·8	1·3	5·1	73	27	. .
	Second 8 Years, 1860-1 to 1867-8	3,753,011	28⅜	13,309,247	12,253,712	8,097,760	20,351,472	29,606,462	3·3	2·2	5·5	60	40	. .
	16 Years, 1852-3 to 1867-8	3,922,586	28¼	13,810,013	12,706,785	6,375,272	19,082,057	28,836,816	3·5	1·8	5·3	67	33	. .

ceed briefly to direct attention to some of the most important facts which the figures bring to light.

In regard to England and Wales the result is that, during the last eight years as compared with the previous eight, the area under wheat is estimated to have diminished by about 4 per cent., the yield per acre to have increased by little over 2 per cent., and the total produce accordingly diminished by about $1\frac{3}{4}$ per cent. The diminution in aggregate home-produce available as human food amounts during the last eight years as compared with the previous eight, to $1\frac{1}{2}$ per cent.; whilst there is an increase in the imports during the same period of nearly 80 per cent.—the result being an increase in the estimated total wheat consumed in England and Wales during the last eight years as compared with the former eight, of between 15 and 16 per cent. Against this increase in consumption, however, there is an increase of population of little more than 9 per cent. The result is a diminution in the proportion in which the total consumption per head is supplied from home resources from 79 to 66 per cent., and an increase in the proportion in which the whole is supplied by imports from 21 to 34 per cent. Lastly, according to the figures, the actual consumption of wheat per head of the population has increased by nearly 6 per cent.

Since the apportionment between England and Wales on the one hand, and Scotland on the other, of the imports into Great Britain during the first ten years of the sixteen, was, to a great extent, arbitrary, as already explained, and since, owing to the comparatively small figures for Scotland, any error in the apportionment would more affect the results in regard to it than those relating to England and Wales, the indications of the figures must of course be accepted with more of caution. It may be stated in general terms, however, that whilst the area under the crop and the total home-produce of wheat in Scotland would appear to have diminished during the last eight years as compared with the former eight, very much more, proportionally, than in England and Wales, the imports, on the other hand, must be supposed to have considerably increased; though whether in a greater or a less proportion than in England and Wales, is, however, doubtful; as also is the indication of the figures that the consumption of wheat per head of the population has not increased.

The results relating to Great Britain are on most points more satisfactory than those relating either to England and Wales, or to Scotland separately. The conclusions in regard to Great Britain are, that, comparing the two periods of eight years each, the area has diminished during the latter half by nearly 6 per cent., the yield per acre increased by rather over $2\frac{1}{2}$ per cent., and

the aggregate home-produce available as human food diminished by about 2¾ per cent. On the other hand the imports have increased by more than 65 per cent., and the total wheat consumed by about 14 per cent. The population has, however, increased by scarcely 8½ per cent. The general result is an increase in consumption per head of more than 5 per cent., a decrease from 75 to 64 per cent. in the proportion in which the total consumption per head is supplied by home resources, and an increase from 25 to 36 per cent. in the proportion in which it is supplied from imports.

The records both as to home-produce and imports are more complete for Ireland than for any other part of the United Kingdom. The comparison of the results relating to the two periods of eight years each shows a diminution of area under wheat during the latter period of about 29 per cent., a diminution in yield per acre of about 17 per cent., and a diminution of home-produced wheat available for consumption of about 43 per cent. Against this very marked reduction in the home supplies of wheat in Ireland we have an increase in the imports of about 123 per cent.; the result being an increase in the total wheat consumed in the country of about 14 per cent., whilst the population has diminished between 5 and 6 per cent. The general result is an increase in the total consumption of wheat per head in Ireland of more than 20 per cent.; and, of the total amount consumed per head, there has been a diminution in that supplied by home produce from 66 to 33 per cent., and an increase in that supplied by imports from 34 to 67 per cent.

Obviously, the point of greatest national interest and importance to consider is the progressive or retrogressive position of the United Kingdom as a whole in regard to the several elements of this wide question. Comparing the last eight with the preceding eight years, the figures show a diminution of area under wheat in the United Kingdom during the later period of between 8 and 9 per cent., an increase in yield per acre of about 1⅓ per cent., and a diminution in the total wheat supplied from home produce of nearly 7 per cent. There is, on the other hand, an increase in the foreign supplies of about 74 per cent. The result is an increase in the aggregate amount of wheat consumed in the United Kingdom of between 14 and 15 per cent., with an increase of population of only about 5½ per cent. Or, looking to the consumption per head of the population, the proportion provided by the home supplies has diminished from 73 to 60 per cent.; whilst that supplied by foreign produce has increased from 27 to 40 per cent.; the result of the whole being an increase in the total consumption per head during the later period of between 8 and 9 per cent.

The main conclusions from the whole inquiry, as brought out by the comparison of the results relating to the first and second periods of eight years each, may be briefly enumerated as follows:—

1. There has been a reduction in the area under wheat in each of the three main divisions of the United Kingdom; very large, proportionally, in both Scotland and Ireland, but comparatively small in England and Wales.

2. There has, pretty certainly, been a small increase in the yield per acre in England and Wales, and probably in Scotland also, but a marked diminution in Ireland; leaving, however, still a small increased yield per acre in the United Kingdom collectively.

3. There has been a diminution in the aggregate of home-produced wheat in the United Kingdom; proportionally small in England and Wales, very considerable in Scotland, and more considerable still in Ireland.

4. Throughout the United Kingdom the imports have increased enormously of late years, and in a much greater proportion in Ireland than in Great Britain.

5. The aggregate amount of wheat consumed annually in the United Kingdom has increased very considerably; and the ratio of increase would appear to be much the same in Great Britain and in Ireland.

6. In the United Kingdom, collectively, the population has increased considerably; in much the greater proportion in England and Wales, less than half as rapidly in Scotland, whilst in Ireland there has been a diminution.

7. The proportion of the total wheat consumed per head of the population, which is provided by home produce, has much diminished throughout the United Kingdom; in by far the greatest degree in Ireland, very largely in Scotland, but much less in England and Wales than in either.

8. In every division of the United Kingdom the proportion of the total wheat consumed per head which is supplied from foreign sources, has enormously increased; in by far a greater degree in Ireland than in either of the other divisions of the Kingdom.

9. The actual consumption of wheat per head in the United Kingdom has notably increased; more than 20 per cent. in Ireland, but little more than 5 per cent. in Great Britain.

10. Taking the average of the last eight years the figures show the annual consumption of wheat per head of the population to have been about $6\frac{1}{3}$ bushels in England and Wales, scarcely $4\frac{1}{4}$ bushels in Scotland, and only about $3\frac{1}{3}$ bushels in Ireland; or, for

the whole of Great Britain, about 6 bushels, and for the whole of the United Kingdom about $5\frac{1}{2}$ bushels per head.

11. Taking the population of the United Kingdom (including the Islands in the British seas) to be at the present time about 30,800,000, and the average consumption of wheat per head per annum to be $5\frac{1}{2}$ bushels, this gives a present requirement of rather more than 21 million (21,175,000) quarters.

12. It may be estimated that, at the recent rate of increase, the population of the United Kingdom will have increased by rather more than 1 million at the end of the next five years; and taking the rate of consumption per head as before, at $5\frac{1}{2}$ bushels, there would then be required nearly 22 million quarters; or, assuming the consumption to have increased to $5\frac{3}{4}$ bushels per head, the requirement would then be nearly 23 million quarters.

13. Unless the home-produce of wheat in the United Kingdom available as human food (about $12\frac{1}{4}$ million quarters per annum over the last eight years) should increase, it is obvious that, even at the lower rate of consumption above supposed ($5\frac{1}{2}$ bushels per head), there will be required over the next five years an average importation of between 9 and 10 million quarters annually.

APPENDIX—TABLE I.

PARTICULARS OF HOME-PRODUCE, IMPORTS, CONSUMPTION, AND AVERAGE PRICE OF WHEAT.

ENGLAND AND WALES.

Harvest Years. — Sept. 1 to Aug. 31.	Estimated Home-produce.			Available for Consumption.			Population (middle of Harvest Years).	Available for Consumption per Head.			Average Price per Quarter.
	Area under Crop.	Average Yield per Acre.	Total Home-produce.	Home-produce, less 2¼ Bushels per Acre for Seed.	Imports, less Exports.	Total.		From Home-produce.	From Imports.	Total.	
	Acres.	Bushels.	Quarters.	Quarters.	Quarters.	Quarters.		Bushels.	Bushels.	Bushels.	s. d.
1852–3	3,493,665	22½	9,825,933	8,843,340	4,116,933	12,960,273	18,333,980	3·9	1·8	5·7	43 10
1853–4	3,475,567	20¼	8,797,529	7,820,026	4,471,379	12,291,405	18,545,663	3·4	1·9	5·3	73 7
1854–5	3,457,469	35⅞	15,504,588	14,532,175	1,490,037	16,022,212	18,758,103	6·2	0·6	6·8	70 1
1855–6	3,439,371	27⅜	11,769,098	10,801,775	1,720,657	12,522,432	18,971,275	4·6	0·7	5·3	73 8
1856–7	3,421,273	27¼	11,653,711	10,691,478	2,954,355	13,645,833	19,185,148	4·5	1·2	5·7	60 1
1857–8	3,403,175	35	14,888,891	13,931,748	4,332,310	18,264,058	19,399,699	5·7	1·8	7·5	47 8
1858–9	3,385,077	32½	13,751,875	12,799,822	2,735,758	15,535,580	19,614,898	5·2	1·1	6·3	43 8
1859–60	3,366,979	26¼	11,047,900	10,100,937	2,263,270	12,364,207	19,830,709	4·1	0·9	5·0	48 3
1860–1	3,348,881	22¼	9,314,075	8,372,202	7,576,309	15,948,511	20,047,114	3·3	3·0	6·3	55 3
1861–2	3,330,783	26⅛	10,877,088	9,940,305	6,197,850	16,138,155	20,264,083	3·9	2·5	6·4	58 2
1862–3	3,312,685	30⅝	12,681,372	11,749,679	6,313,301	18,062,980	20,481,580	4·6	2·5	7·1	47 8
1863–4	3,294,587	39¾	16,369,979	15,443,376	4,327,680	19,771,056	20,699,584	5·9	1·7	7·6	41 0
1864–5	3,276,489	36	14,744,201	13,822,688	2,992,299	16,814,987	20,918,066	5·3	1·1	6·4	40 1
1865–6	3,258,391	31⅛	12,677,177	11,760,755	4,372,972	16,133,727	21,136,995	4·4	1·7	6·1	46 6
1866–7	3,240,293	25½	10,328,434	9,417,102	5,064,815	14,481,917	21,356,345	3·5	1·9	5·4	61 7
1867–8	3,256,758	21	8,548,990	7,633,027	6,105,872	13,738,899	21,576,087	2·8	2·3	5·1	68 5
1868–9	(3,360,090)*	(34⅝)	(14,542,890)	(13,597,865)	..	..	(21,798,090)	(5·0)	..	..	..
Means 1852-3 to 1867-8	3,360,090	28¾	12,048,803	11,103,777	4,189,737	15,293,514	19,944,958	4·4	1·7	6·1	55 0

* As it is supposed that the area was large, the mean of the 16 years, instead of the mean of the Returns for the two preceding years, is adopted here.

APPENDIX—TABLE II.

PARTICULARS OF HOME-PRODUCE, IMPORTS, AND CONSUMPTION OF WHEAT.

SCOTLAND.

Harvest Years. — Sept. 1 to Aug. 31.	ESTIMATED HOME-PRODUCE. Area under Crop.	Average yield per Acre.	Total Home-Produce.	AVAILABLE FOR CONSUMPTION. Home-produce, less 2½ Bushels per Acre for Seed.	Imports, less Exports.	Total.	Population (middle of harvest years).	AVAILABLE FOR CONSUMPTION PER HEAD. From Home-produce.	From Imports.	Total.
	Acres.	Bushels.	Quarters.	Quarters.	Quarters.	Quarters.		Bushels.	Bushels.	Bushels.
1852–3	211,500	22½	594,844	535,360	1,004,051	1,539,411	2,932,212	1·5	2·7	4·2*
1853–4	211,500	20¼	535,359	475,875	1,074,215	1,550,090	2,952,552	1·3	2·9	
1854–5	168,216	28⅞	606,085	558,774	1,001,411	1,560,185	2,971,780	1·5	2·7	
1855–6	191,301	26½	632,884	579,081	990,600	1,569,681	2,989,869	1·6	2·6	
1156–7	263,328	27⅝	908,869	834,808	743,760	1,578,568	3,006,797	2·2	2·0	
1857–8	223,153	27⅝	769,373	706,611	880,226	1,586,837	3,022,547	1·9	2·3	
1858–9	199,781	32½	811,610	755,422	839,053	1,594,475	3,037,096	2·0	2·2	
1859–60	188,571	26¼	618,749	565,713	1,035,762	1,601,475	3,050,429	1·5	2·7	
1860–1	177,361	22¼	493,285	443,402	1,164,499	1,607,901	3,062,668	1·2	3·0	
1861–2	166,151	26⅛	542,587	495,857	1,120,200	1,616,057	3,078,204	1·3	2·9	
1862–3	154,941	30⅝	593,134	549,557	1,158,136	1,707,693	3,095,560	1·4	3·0	4·4
1863–4	143,731	39¾	714,163	673,738	1,118,241	1,791,979	3,112,916	1·7	2·9	4·6
1864–5	132,521	36	596,345	559,074	988,400	1,547,474	3,130,272	1·4	2·5	3·9
1865–6	121,311	31⅛	471,976	437,857	1,475,787	1,913,644	3,147,628	1·1	3·8	4·9
1866–7	110,101	25½	350,947	319,981	1,032,647	1,352,628	3,164,984	0·8	2·6	3·4
1867–8	111,118	21	291,685	260,432	1,328,465	1,588,897	3,182,340	0·7	3·3	4·0
1868–9	(110,610)†	(34⅝)	(478,734)	(447,625)	..	..	(3,199,791)	(1·1)	..	..
Means 1852-3 to 1867-8	173,412	27½	595,743	546,971	1,059,716	1,606,687	3,058,616	1·4	2·8	4·2

* Assumed, according to the average of the 6 years, 1862-3 to 1867-8, for which Returns of the separate imports into Scotland are available.
† The mean of the Returns for the two preceding years adopted here.

APPENDIX—TABLE III.

PARTICULARS OF HOME-PRODUCE, IMPORTS, AND CONSUMPTION OF WHEAT.

GREAT BRITAIN.

Harvest Years. — Sept. 1 to Aug. 31.	ESTIMATED HOME-PRODUCE.			AVAILABLE FOR HOME CONSUMPTION.			Population (middle of harvest years).	AVAILABLE FOR CONSUMPTION PER HEAD.		
	Area under Crop.	Average yield per Acre.	Total Home-Produce.	Home-produce, less 2¼ Bushels per Acre for Seed.	Imports, less Exports.	Total.		From Home-produce.	From Imports.	Total.
	Acres.	Bushels.	Quarters.	Quarters.	Quarters.	Quarters.		Bushels.	Bushels.	Bushels.
1852–3	3,705,165	22½	10,420,777	9,378,700	5,120,984	14,499,684	21,266,192	3·5	1·9	5·4
1853–4	3,687,067	20¼	9,332,888	8,295,901	5,545,594	13,841,495	21,498,215	3·1	2·1	5·2
1854–5	3,625,685	35½	16,110,673	15,090,949	2,491,448	17,582,397	21,729,883	5·6	0·9	6·5
1855–6	3,630,672	27⅜	12,401,982	11,380,856	2,711,257	14,092,113	21,961,144	4·2	1·0	5·2
1856–7	3,684,601	27¼	12,562,580	11,526,286	3,698,115	15,224,401	22,191,945	4·2	1·3	5·5
1857–8	3,626,328	34½	15,658,264	14,638,359	5,212,536	19,850,895	22,422,246	5·2	1·9	7·1
1858–9	3,584,858	32½	14,563,485	13,555,244	3,574,811	17,130,055	22,651,994	4·8	1·3	6·1
1859–60	3,555,550	26¼	11,666,649	10,666,650	3,299,032	13,965,682	22,881,138	3·7	1·2	4·9
1860–1	3,526,242	22¼	9,807,360	8,815,604	8,740,808	17,556,412	23,109,782	3·1	3·0	6·1
1861–2	3,496,934	26⅛	11,419,675	10,436,162	7,318,050	17,754,212	23,342,287	3·6	2·5	6·1
1862–3	3,467,626	30⅝	13,274,506	12,299,236	7,471,437	19,770,673	23,577,140	4·2	2·5	6·7
1863–4	3,488,318	39¾	17,084,142	16,117,114	5,445,921	21,563,035	23,812,500	5·4	1·8	7·2
1864–5	3,409,010	36	15,340,546	14,381,762	3,980,699	18,362,461	24,048,338	4·8	1·3	6·1
1865–6	3,379,702	31⅛	13,149,153	12,198,612	5,848,759	18,047,371	24,284,623	4·0	1·9	5·9
1866–7	3,350,394	25½	10,679,381	9,737,083	6,097,462	15,834,545	24,521,329	3·2	2·0	5·2
1867–8	3,367,876	21	8,840,675	7,893,459	7,434,337	15,327,796	24,758,427	2·6	2·4	5·0
1868–9	(3,470,700)	(34⅝)	(15,021,624)	(14,045,490)	..	..	(24,997,881)	(4·5)	..	..
Means 1852-3 to 1867-8	3,533,502	28⅜	12,644,546	11,650,748	5,249,453	16,900,201	23,008,574	4·1	1·8	5·9

Appendix—Table IV.

Particulars of Home-produce, Imports, and Consumption of Wheat.

IRELAND.

Harvest Years. Sept. 1 to Aug. 31.	Estimated Home-produce. Area under Crop.	Estimated Home-produce. Average Yield per Acre.	Estimated Home-produce. Total Home-produce.	Available for Consumption. Home-produce, less $2\frac{1}{4}$ Bushels per Acre for Seed.	Available for Consumption. Imports, less Exports.	Available for Consumption. Total.	Population (middle of Harvest Years).	Available for Consumption per Head. From Home-produce.	Available for Consumption per Head. From Imports.	Available for Consumption per Head. Total.
	Acres.	Bushels.	Quarters.	Quarters.	Quarters.	Quarters.		Bushels.	Bushels.	Bushels.
1852–3	353,566	26$\frac{1}{2}$	1,154,205	1,054,764	781,016	1,835,780	6,244,952	1·4	1·0	2·4
1853–4	326,896	27$\frac{3}{4}$	1,133,585	1,041,645	546,406	1,588,051	6,121,784	1·4	0·7	2·1
1854–5	411,284	28$\frac{1}{4}$	1,452,467	1,336,793	491,552	1,828,345	6,037,505	1·7	0·7	2·4
1855–6	445,775	27$\frac{1}{4}$	1,520,819	1,395,444	553,743	1,949,187	5,986,789	1·9	0·7	2·6
1856–7	529,050	24$\frac{5}{8}$	1,629,963	1,481,167	414,469	1,895,636	5,937,253	2·0	0·6	2·6
1857–8	559,646	23$\frac{3}{4}$	1,662,957	1,505,556	583,151	2,088,707	5,900,361	2·0	0·8	2·8
1858–9	546,964	25$\frac{1}{2}$	1,746,464	1,592,630	980,859	2,573,489	5,871,412	2·2	1·3	3·5
1859–60	464,175	25$\frac{1}{4}$	1,468,475	1,337,925	1,217,300	2,555,225	5,834,544	1·8	1·7	3·5
1860–1	466,415	21$\frac{3}{4}$	1,271,588	1,140,408	1,283,160	2,423,568	5,799,263	1·6	1·8	3·4
1861–2	401,243	17	851,871	739,021	1,781,405	2,520,426	5,785,823	1·0	2·5	3·5
1862–3	356,321	15$\frac{1}{4}$	683,048	582,833	1,733,649	2,316,482	5,754,555	0·8	2·4	3·2
1863–4	260,311	25$\frac{3}{4}$	837,906	764,693	1,545,349	2,310,042	5,696,728	1·1	2·2	3·3
1864–5	276,483	25$\frac{1}{4}$	875,782	798,021	1,520,006	2,318,027	5,652,493	1·1	2·2	3·3
1865–6	266,989	24$\frac{3}{4}$	826,783	751,693	1,464,267	2,215,960	5,602,112	1·1	2·1	3·2
1866–7	299,190	21$\frac{1}{2}$	805,710	721,562	1,535,571*	2,257,133	5,565,672	1·0	2·2	3·2
1867–8	261,034	22$\frac{1}{4}$	725,847	652,431	1,581,206*	2,233,637	5,540,627	0·9	2·3	3·2
1868–9	(280,112)†	(25$\frac{1}{8}$)	(879,727)	(800,945)	..	..	(5,515,695)	(1·2)	..	..
Means 1852-3 to 1867-8	389,084	23$\frac{7}{8}$	1,165,467	1,056,037	1,125,819	2,181,856	5,833,242	1·4	1·6	3·0

* No statement of exports found for 1867 or 1868.
† The mean of the Returns for the two preceding years adopted here.

Appendix—Table V.

Particulars of Home-produce, Imports, and Consumption of Wheat.

UNITED KINGDOM.*

Harvest Years. Sept. 1 to Aug. 31.	Estimated Home-produce.			Available for Consumption.			Population (middle of Harvest Years).	Available for Consumption per Head.		
	Area under Crop.	Average Yield per Acre.	Total Home-produce.	Home-produce, less 2¼ Bushels per Acre for Seed.	Imports, less Exports.	Total.		From Home-produce.	From Imports.	Total.
	Acres.	Bushels.	Quarters.	Quarters.	Quarters.	Quarters.		Bushels.	Bushels.	Bushels.
1852–3	4,058,731	22⅞	11,574,982	10,433,464	5,902,000	16,335,464	27,511,144	3·0	1·7	4·7
1853–4	4,013,963	20⅞	10,466,473	9,337,546	6,092,000	15,429,546	27,619,999	2·7	1·8	4·5
1854–5	4,036,969	34¾	17,563,140	16,427,742	2,983,000	19,410,742	27,767,388	4·7	0·9	5·6
1855–6	4,076,447	27⅜	13,922,801	12,776,300	3,265,000	16,041,300	27,947,933	3·7	0·9	4·6
1856–7	4,213,651	27	14,192,543	13,007,453	4,112,584	17,120,037	28,129,198	3·7	1·2	4·9
1857–8	4,185,974	33⅛	17,321,221	16,143,915	5,795,687	21,939,602	28,322,607	4·6	1·6	6·2
1858–9	4,131,822	31½	16,309,949	15,147,874	4,555,670	19,703,544	28,523,406	4·2	1·3	5·5
1859–60	4,019,725	26⅛	13,135,124	12,004,575	4,516,332	16,520,907	28,715,682	3·3	1·3	4·6
1860–1	3,992,657	22⅛	11,078,948	9,956,012	10,023,968	19,979,980	28,909,045	2·8	2·8	5·6
1861–2	3,898,177	25¼	12,271,546	11,175,183	9,099,455	20,274,638	29,128,110	3·1	2·5	5·6
1862–3	3,823,947	29¼	13,957,554	12,882,069	9,205,086	22,087,155	29,331,695	3·5	2·5	6·0
1863–4	3,698,629	38¾	17,922,048	16,881,807	6,991,270	23,873,077	29,509,228	4·6	1·9	6·5
1864–5	3,685,493	35¼	16,216,328	15,179,783	5,500,705	20,680,488	29,700,831	4·1	1·5	5·6
1865–6	3,646,691	30⅝	13,975,936	12,950,305	7,313,026	20,263,331	29,886,735	3·5	1·9	5·4
1866–7	3,649,584	25⅛	11,485,091	10,458,645	7,633,033	18,091,678	30,087,001	2·8	2·0	4·8
1867–8	3,628,910	21	9,566,522	8,545,890	9,015,543	17,561,433	30,299,054	2·3	2·4	4·7
1868–9	(3,750,812)	(34)	(15,901,351)	(14,846,435)	..	..	(30,513,576)	(3·9)	..	..
Means 1852-3 to 1867-8	3,922,586	28¼	13,810,013	12,706,785	6,375,272	19,082,057	28,836,816	3·5	1·8	5·3

* Exclusive of the Islands in the British Seas.

XXVI.—*On the Causes of the Benefits of Clover as a Preparatory Crop for Wheat.* By Dr. Augustus Voelcker.

Agricultural chemists inform us, that in order to maintain the productive powers of the land unimpaired, we must restore to it the phosphoric acid, potash, nitrogen, and other substances which enter into the composition of our farm-crops; the constant removal of organic and inorganic soil-constituents by the crops usually sold off the farm, leading, as is well known, to more or less rapid deterioration and gradual exhaustion of the land. Even the best wheat-soils of this and other countries become more and more impoverished, and sustain a loss of wheat-yielding power, when corn-crops are grown in too rapid succession without manure. Hence the universal practice of manuring, and that also of consuming oil-cake, corn, and similar purchased food on land naturally poor, or partially exhausted by previous cropping.

Whilst, however, it holds good as a general rule that no soil can be cropped for any length of time without gradually becoming more and more infertile, if no manure be applied to it, or if the fertilising elements removed by the crops grown thereon be not by some means or other restored, it is nevertheless a fact that after a heavy crop of clover carried off as hay, the land, far from being less fertile than before, is peculiarly well adapted, even without the addition of manure, to bear a good crop of wheat in the following year, provided the season be favourable to its growth. This fact, indeed, is so well known that many farmers justly regard the growth of clover as one of the best preparatory operations which the land can undergo in order to its producing an abundant crop of wheat in the following year. It has further been noticed that clover mown twice leaves the land in a better condition as regards its wheat-producing capabilities, than when mown once only for hay, and the second crop fed off on the land by sheep; for notwithstanding that in the latter instance the fertilizing elements in the clover-crop are in part restored in the sheep excrements, yet contrary to expectation, this partial restoration of the elements of fertility to the land has not the effect of producing more or better wheat in the following year than is reaped on land from off which the whole clover crop has been carried, and to which no manure whatever has been applied.

Again, in the opinion of several good practical agriculturists with whom I have conversed on the subject, land whereon clover has been grown for seed in the preceding year, yields a better crop of wheat than it does when the clover is mown

twice for hay, or even only once, and afterwards fed off by sheep. Most crops left for seed, I need hardly observe, exhaust the land far more than they do when they are cut down at an earlier stage of their growth; hence the binding clauses in most farm leases which compel the tenant not to grow corn crops more frequently nor to a greater extent than stipulated. However, in the case of clover grown for seed we have, according to the testimony of trustworthy witnesses, an exception to a law generally applicable to most other crops.

Whatever may be the true explanation of the apparent anomalies connected with the growth and chemical history of the clover-plant, the facts just mentioned having been noticed not once or twice only, or by a solitary observer, but repeatedly, and by numbers of intelligent farmers, are certainly entitled to credit; and little wisdom, as it strikes me, is displayed by calling them into question, because they happen to contradict the prevailing theory, according to which a soil is said to become more or less impoverished in proportion to the large or small amount of organic and mineral soil-constituents carried off in the produce.

Agricultural experiences contradicting prevailing, and it may be, generally current theories, are, unless I am much mistaken, of far more common occurrence than may be known to those who are either naturally unobservant or unacquainted with many of the details of farming operations. Indeed, an interesting and instructive treatise might be written on the apparent anomalies in agriculture, and a collection of trustworthy facts of the kind alluded to would afford valuable hints to intelligent farmers, and suggest matter for inquiry to chemists and others engaged in scientific pursuits.

To me it seems inconsistent with the exercise of common sense, and opposed alike to the whole tenor of a well-regulated mind and the progress of scientific agriculture, to discuss agricultural matters in the dogmatic spirit too often so painfully observable when people meet together for the discussion of subjects relating to farm practice; but still more painful is the spirit which pervades the writings of certain scientific men who are bold enough from isolated, or even a number of analogous facts, to frame general and invariable laws, in accordance with which they propose to regulate the profession of agriculture. That there are certain fixed laws which determine the growth of the meanest herb and the mightiest forest tree, no one can gainsay, but it may well be doubted whether our corn or forage crops would remain as flourishing as they at present are, if, in peference to some pretty theory, the farmers of England suddenly threw aside their past experience, and endeavoured to grow corn

in accordance with a mathematical formula which men may fancy they have discovered, and by which they may suppose the development of our corn-crops to be governed. Even great men, by taking too general, or as it is often erringly termed, a comprehensive view of agricultural matters, sometimes totally misrepresent the very law they are endeavouring to establish.

The patient investigation of many of the details, with which those only are perfectly familiar whose daily occupation is in the field or in the feeding-stall, is however often rewarded by success. Mysteries which puzzle the minds of intelligent farmers are cleared up, the influences which modify a general rule or practice in farming operations are clearly recognised, and by degrees principles are established, which, assigning the benefits or disadvantages of a certain course of proceeding to their real cause, must ever tend to confirm the experienced in good practice, and afford valuable hints in guiding those inexperienced in farm management.

In the course of a long residence in a purely agricultural district, I have often been struck with the remarkably healthy appearance and good yield of wheat on land from which a heavy crop of clover hay was obtained in the preceding year. I have likewise had frequent opportunities of observing that, as a rule, wheat grown on part of a field whereon clover has been twice mown for hay is better than the produce of that on the part of the same field on which the clover has been mown only once for hay, and afterwards fed off by sheep. These observations, extending over a number of years, led me to inquire into the reasons why clover is specially well fitted to prepare land for wheat, and in the paper, which I have now the pleasure of laying before the readers of the Journal, I shall endeavour, as the result of my experiments on the subject, to give an intelligible explanation of the fact that clover is so excellent a preparatory crop for wheat as it is practically known to be.

By those taking a superficial view of the subject, it may be suggested that any injury likely to be caused by the removal of a certain amount of fertilising matter is altogether insignificant, and more than compensated for by the benefit which results from the abundant growth of clover roots and the physical improvement in the soil which takes place in their decomposition. Looking, however, more closely into the matter, it will be found that in a good crop of clover-hay a very considerable amount of both mineral and organic substances is carried off the land, and that if the total amount of such constituents in a crop had to be regarded exclusively as the measure for determining the relative degrees in which different farm-crops exhaust the land, clover

would have to be described as about the most exhausting crop in the entire rotation.

Clover-hay on an average and in round numbers contains in 100 parts:—

Water	17·0
*Nitrogenous substances (flesh-forming matters)	15·6
Non-nitrogenous compounds	59·9
Mineral matter (ash)	7·5
	100·0

* Containing nitrogen .. .. 2·5

The mineral portion or ash in 100 parts of clover-hay consists of—

Phosphoric acid	7·5
Sulphuric acid	4·3
Carbonic acid	18·0
Silica	3·0
Lime	30·0
Magnesia	8·5
Potash	20·0
Soda, chloride of sodium, oxide of iron, sand, loss, &c.	8·7
	100·0

Let us suppose the land to have yielded 4 tons of clover-hay per acre. According to the preceding data we find that such a crop includes 224 lbs. of nitrogen, equal to 272 lbs. of ammonia, and 672 lbs. of mineral matter or ash constituents.

In 672 lbs. of clover-ash we find:—

Phosphoric acid	51½	lbs.
Sulphuric acid	29	„
Carbonic acid	121	„
Silica	20	„
Lime	201	„
Magnesia	57	„
Potash	134½	„
Soda, chloride of sodium, oxide of iron, sand, &c.	58	„
	672	lbs.

Four tons of clover-hay, the produce of one acre, thus contain a large amount of nitrogen, and remove from the soil an enormous quantity of mineral matters, abounding in lime and potash, and containing also a good deal of phosphoric acid.

Leaving for a moment the question untouched whether the nitrogen contained in the clover is derived from the soil or from the atmosphere, or partly from the one and partly from the other, no question can arise as to the original source from which the mineral matters in the clover-produce is derived. In relation, therefore, to the ash-constituents, clover must be regarded as one

of the most exhausting crops usually cultivated in this country. This appears strikingly to be the case when we compare the preceding figures with the quantity of mineral matters which an average crop of wheat removes from an acre of land.

The grain and straw of wheat contain in round numbers in 100 parts:—

	Grain of Wheat.		Straw.
Water	15·0	....	16·0
*Nitrogenous substances (flesh-forming matters)	11·1	....	4·0
Non-nitrogenous substances	72·2	....	74·9
Mineral matter (ash)	1·7	....	5·1
	100·0	....	100·0
* Containing nitrogen	1·78	....	·64

The ash of wheat contains in 100 parts:—

	Grain.		Straw.
Phosphoric acid	50·0	....	5·0
Sulphuric acid	0·5	....	2·7
Carbonic acid	..	....	..
Silica	2·5	....	67·0
Lime	3·5	....	5·5
Magnesia	11·5	....	2·0
Potash	30·0	....	13·0
Soda, chloride of sodium, oxide of iron, sand, &c.	2·0	....	4·8
	100·0	....	100·0

The mean produce of wheat per acre may be estimated at 25 bushels, which, at 60 lbs. per bushel, gives 1500 lbs.; and as the weight of the straw is generally twice that of the grain, its produce will be 3000 lbs. According, therefore, to the preceding data, there will be carried away from the soil:—

In 1500 lbs. of the grain .. 25 lbs. of mineral food (in round numbers)
In 3000 lbs. of the straw .. 150 " " "

Total .. .. .. 175 lbs.

On the average of the analyses, it will be found that the composition of these 175 lbs. is as follows:—

	In the grain.		In the straw.		Total.
Phosphoric acid	12·5 lbs.	....	7·5 lbs.	....	20·0 lbs.
Sulphuric acid	0·1 "	....	4·0 "	....	4·1 "
Carbonic acid	..	....	..	....	..
Silica	0·6 "	....	100·5 "	....	101·1 "
Lime	0·9 "	....	8·2 "	....	9·1 "
Magnesia	2·9 "	....	3·0 "	....	5·9 "
Potash	7·5 "	....	19·5 "	....	27·0 "
Soda, chloride of sodium, oxide of iron, sand, &c.	0·5 "	....	7·3 "	....	7·8 "
	25 lbs.		150 lbs.		175 lbs.

The total quantity of ash-constituents carried off the land in an average crop of wheat thus amounts to only 175 lbs. per acre, whilst a good crop of clover removes as much as 672 lbs.

Nearly two-thirds of the total amount of mineral in the grain and straw of one acre of wheat consists of silica, of which there is an ample supply in almost every soil. The restoration of silica, therefore, need not trouble us in any way, especially as there is not a single instance on record proving that silica, even in a soluble condition, has ever been applied to land with the slightest advantage to corn or grass crops, which are rich in silica, and which, for this reason, may be assumed to be particularly grateful for a supply of it in a soluble state. Silica, indeed, if at all capable of producing a beneficial effect, ought to be useful to these crops, either by strengthening the straw or stems of graminaceous plants, or otherwise benefiting them; but after deducting the amount of silica from the total amount of mineral matters in the wheat produce from one acre, only a trifling quantity of other and more valuable fertilising ash-constituent of plants will be left. On comparing the relative amounts of phosphoric acid and potash in an average crop of wheat and a good crop of clover-hay, it will be seen that 1 acre of clover-hay contains as much phosphoric acid as 2½ acres of wheat, and as much potash as the produce from 5 acres of the same crop. Clover thus unquestionably removes from the land very much more mineral matter than is done by wheat; wheat carries off the land at least three times as much of the more valuable mineral constituents as that abstracted by the clover. Wheat notwithstanding succeeds remarkably well after clover.

Four tons of clover-hay, or the produce of an acre, contains, as already stated, 224 lbs. of nitrogen, or, calculated as ammonia, 272 lbs.

Assuming the grain of wheat to furnish 1·78 per cent. of nitrogen, and wheat-straw ·64 per cent., and assuming also that 1500 lbs of corn and 3000 lbs. of straw represent the average produce per acre, there will be in the grain of wheat per acre 26·7 lbs. of nitrogen, and in the straw 19·2 lbs., or in both together 46 lbs. of nitrogen; in round numbers, equal to about 55 lbs. of ammonia, which is only about one-fifth the quantity of nitrogen in the produce of an acre of clover. Wheat, it is well known, is specially benefited by the application of nitrogenous manures, and as clover carries off so large a quantity of nitrogen, it is natural to expect the yield of wheat after clover to fall short of what the land might be presumed to produce without manure before a crop of clover was taken from it. Experience, however, has proved the fallacy of this presumption, for the result is exactly the opposite, inasmuch as a better and heavier crop of wheat is produced than

without the intercalation of clover. What, it may be asked, is the explanation of this apparent anomaly?

In taking up this inquiry I was led to pass in review the celebrated and highly important experiments, undertaken by Mr. Lawes and Dr. Gilbert, on the continued growth of wheat on the same soil for a long succession of years, and to examine likewise carefully many points, to which attention is drawn by the same authors in their memoirs on the growth of red clover by different manures, and on the Lois Weedon plan of growing wheat. Abundant and most convincing evidence is supplied by these indefatigable experimenters that the wheat-producing powers of a soil are not increased in any sensible degree by the liberal supply of all the mineral matters which enter into the composition of the ash of wheat, and that the abstraction of these mineral matters from the soil, in any much larger proportions than possibly can take place under ordinary cultivation, in no wise affects the yield of wheat, provided there be at the same time a liberal supply of available nitrogen within the soil itself. The amount of the latter, therefore, is regarded by Messrs. Lawes and Gilbert as the measure of the increased produce of grain which a soil furnishes.

In conformity with these views the farmer, when he wishes to increase the yield of his wheat, finds it to his advantage to have recourse to ammoniacal or other nitrogenous manures, and depends more or less entirely upon the soil for the supply of the necessary mineral or ash-constituents of wheat, having found such a supply to be amply sufficient for his requirements. As far, therefore, as the removal from the soil of a large amount of mineral soil-constituents by the clover-crop is concerned, the fact viewed in the light of the Rothamsted experiments, becomes at once intelligible; for notwithstanding the abstraction of over 600 lbs. of mineral matter by a crop of clover, the succeeding wheat-crop does not suffer. Inasmuch, however, as we have seen that not only much mineral matter is carried off the land in a crop of clover, but also much nitrogen, we might, in the absence of direct evidence to the contrary, be led to suspect that wheat after clover would not be a good crop; whereas the result is exactly the reverse.

It is worthy of notice that nitrogenous manures which have such a marked and beneficial effect upon wheat do no good, but in certain combinations, in some seasons, do positive harm to clover. Thus Messrs. Lawes and Gilbert, in a series of experiments on the growth of red clover by different manures, obtained 14 tons of fresh green produce, equal to about $3\frac{3}{4}$ tons of clover-hay from the unmanured portion of the experimental field; and where sulphates of potash, soda, and magnesia, or sulphate of

potash and superphosphate of lime were employed, 17 to 18 tons (equal to from about 4½ to nearly 5 tons of hay) were obtained. When salts of ammonia were added to the mineral manures, the produce of clover-hay was, upon the whole, less than where the mineral manures were used alone. The wheat grown after the clover on the unmanured plot gave, however, 29½ bushels of corn, whilst in the adjoining field, where wheat was grown after wheat without manure, only 15½ bushels of corn per acre were obtained. Messrs. Lawes and Gilbert notice especially that in the clover-crop of the preceding year very much larger quantities both of mineral matters and of nitrogen were taken from the land than were removed in the unmanured wheat-crop in the same year, in the adjoining field. Notwithstanding this, the soil from which the clover had been taken was in a condition to yield 14 bushels more wheat per acre than that upon which wheat had been previously grown; the yield of wheat after clover, in these experiments, being fully equal to that in another field, where very large quantities of manure were used.

Taking all these circumstances into account, is there not presumptive evidence that notwithstanding the removal of a large amount of nitrogen in the clover-hay, an abundant store of available nitrogen is left in the soil, and also that in its relations towards nitrogen in the soil clover differs essentially from wheat? The results of our experience in the growth of the two crops appear to indicate that whereas the growth of the wheat rapidly exhausts the land of its available nitrogen, that of clover, on the contrary, tends somehow or other to accumulate nitrogen within the soil itself. If this can be shown to be the case, an intelligible explanation of the fact that clover is so useful as a preparatory crop for wheat will be found in the circumstance that during the growth of clover, nitrogenous food, for which wheat is particularly grateful, is either stored up or rendered available in the soil.

An explanation, however plausible, can hardly be accepted as correct if based mainly on data which, although highly probable, are not proved to be based on fact. In chemical inquiries especially, nothing must be taken for granted that has not been proved by direct experiment. The following questions naturally suggest themselves in reference to this subject: What is the amount of nitrogen in soils of different characters? What is the amount, more particularly after a good and after an indifferent crop of clover? Why is the amount of nitrogen in soils larger after clover than after wheat and other crops? Is the nitrogen present in a condition in which it is available and useful to wheat? and lastly, Are there any other circumstances, apart from the supply of nitrogenous matter in the soil, which help to

account for the beneficial effects of clover as a preparatory crop for wheat?

In order to throw some light on these questions, and, if possible, to give distinct answers to at least some of them, I, years ago, when residing at Cirencester, began a series of experiments, and more recently I have been fortunate enough to obtain the co-operation of Mr. Robert Vallentine, of Leighton Buzzard, who kindly undertook to supply me with materials for my analyses.

My first experiments were made on a thin calcareous clay soil, resting on oolitic limestone, and producing generally a fair crop of red clover. The clover-field formed the slope of a rather steep hillock, and varied much in depth. At the top of the hill the soil became very stony, at a depth of 4 inches, so that it could only with difficulty be excavated to a depth of 6 inches, when the bare limestone rock made its appearance. At the bottom of the field the soil was much deeper, and the clover stronger than at the upper part. On the brow of the hill, where the clover appeared to be strong, a square yard was measured out; and, at a little distance off, where the clover was very bad, a second square yard was measured; in both plots the soil being taken up to a depth of 6 inches. The soil where the clover was good may be distinguished from the other by being marked as No. 1, and that where it was bad as No. 2.

Clover-Soil No. 1 (*Good Clover*).

The roots having first been shaken out to free them as much as possible from soil, were then washed once or twice with cold distilled water, and, after having been dried for a little while in the sun, were weighed, when the square yard produced 1 lb. 10½ oz. of cleaned clover-roots in an air-dry state; an acre of land, or 4840 square yards, accordingly yielded, in a depth of 6 inches, 3·44 tons, or 3½ tons in round numbers, of clover-roots.

Fully dried in a waterbath, the roots were found to contain altogether 44·67 per cent. of water, and on being burnt in a platinum capsule yielded 6·089 of ash. A portion of the dried, finely powdered, and well-mixed roots was burned with soda-lime in a combustion-tube, and the nitrogen contained in the roots otherwise determined in the usual way. Accordingly, the following is the general composition of the roots from soil No. 1:—

Water	44·675
*Organic matter	49·236
Mineral matter	6·089
	100·000
* Containing nitrogen	1·297
Equal to ammonia	1·575

Assuming the whole field to have produced $3\frac{1}{2}$ tons of clover-roots per acre, there will be 99·636 lbs., or in round numbers 100 lbs., of nitrogen in the clover-roots from 1 acre; or about twice as much nitrogen as is present in the average produce of an acre of wheat.

The soil which had been separated from the roots was passed through a sieve to deprive it of any stones it might contain. It was then partially dried, and the nitrogen in it determined in the usual manner by combustion with soda-lime, when it yielded ·313 per cent. of nitrogen, equal to ·38 of ammonia, in one combustion; and ·373 per cent. of nitrogen, equal to ·46 of ammonia, in a second determination.

That the reader may have some idea of the character of this soil, it may be stated that it was further submitted to a general analysis, according to which it was found to have the following composition:—

General Composition of Soil No. I. (Good Clover).

Moisture	18·73
*Organic matter	9·72
Oxides of iron and alumina	13·24
Carbonate of lime	8·82
Magnesia, alkalies, &c.	1·72
Insoluble siliceous matter (chiefly clay)	47·77
	100·00
* Containing nitrogen	·313
Equal to ammonia	·380

The second square yard from the brow of the soil where the clover was bad produced 13 ounces of air-dry and partially clean roots, or 1·75 tons per acre. On analysis they were found to have the following composition:—

Clover roots, No. II. (Bad Clover).

Water	55·732
*Organic matter	39·408
Mineral matter (ash)	4·860
	100·000
* Containing nitrogen	·792
Equal to ammonia	·901

The roots on the spot where the clover was very bad yielded only 31 lbs. of nitrogen per acre, or scarcely one-third of the quantity which was obtained from the roots where the clover was good.

The soil from the second square yard on analysis was found, when freed from stones by sifting, to contain in 100 parts:—

Composition of Soil, No. II. (Bad Clover),

Water	17·24
*Organic matter	9·64
Oxides of iron and alumina	11·89
Carbonate of lime	14·50
Magnesia, alkalies, &c.	1·53
Insoluble siliceous matter	45·20
	100·00

		2nd determination.
* Containing nitrogen	·306	·380
Equal to ammonia	·370	·470

Both portions of the clover soil thus contained about the same percentage of organic matter, and yielded nearly the same amount of nitrogen.

In addition, however, to the nitrogen in the clover-roots, a good deal of nitrogen, in the shape of root-fibres, decayed leaves, and similar organic matters, was disseminated throughout the fine soil in which it occurred, and from which it could not be separated; but unfortunately I neglected to weigh the soil from a square yard, and am, therefore, unable to state how much nitrogen per acre was present in the shape of small root-fibres and other organic matters. Approximately, the quantity might be obtained by calculation; but, as the actual weight of cultivated soils varies greatly, I abstain from making such a calculation, even though it might be done with propriety, as I took care in the following season to weigh the soil of different parts of the same field.

Before mentioning the details of the experiments made in the next season, I will here give the composition of the ash of the partially cleaned clover-roots:—

Composition of Ash of Clover-roots (partially cleaned).

Oxide of iron and alumina	11·73
Lime	18·49
Magnesia	3·03
Potash	6·88
Soda	1·93
Phosphoric acid	3·61
Sulphuric acid	2·24
Soluble silica	19·01
Insoluble siliceous matter	24·83
Carbonic acid, chlorine, and loss	8·25
	100·00

This ash was obtained from clover-roots, which yielded, when perfectly dry, in round numbers, 8 per cent. of ash. Clover-roots washed quite clean, and separated from all soil, yield about 5 per cent. of ash; but it is extremely difficult to clean a large

quantity of fibrous roots from all dirt, and the preceding analysis distinctly shows that the ash of the clover-roots analysed by me was mechanically mixed with a good deal of fine soil, for oxide of iron and alumina and insoluble siliceous matter in any quantity are not normal constituents of plant-ashes. Making allowance for soil-contamination, the ash of clover-roots, it will be noticed, contains much lime and potash, as well as an appreciable amount of phosphoric and sulphuric acid. On the decay of the clover-roots, these and other mineral fertilising matters are left in the surface-soil in a readily available condition, and in considerable proportions when the clover stands well. Although a crop of clover removes much mineral matter from the soil, it must be borne in mind that its roots extract from the land soluble mineral fertilising matters, which, on the decay of the roots, remain in the land in a prepared and more readily available form than that in which they originally occur. The benefits arising to wheat from the growth of clover may thus be due partly to this preparation and concentration of mineral food in the surface-soil.

The clover on the hill-side field on the whole turned out a very good crop; and as the plant stood the winter well, and this field was left another season in clover without being ploughed up, I availed myself of the opportunity of making, during the following season, a number of experiments similar to those of the preceding year. This time, however, I selected for examination a square yard of soil from a spot on the brow of the hill where the clover was thin and the soil itself stony at a depth of 4 inches; and another plot of one square yard at the bottom of the hill, from a place where the clover was stronger than that on the brow of the hill, and the soil at a depth of 6 inches contained no large stones.

Soil No. 1 (Clover thin), on the Brow of the Hill.

The roots in a square yard, 6 inches deep, when picked out by hand and cleaned as much as possible, weighed in their natural state 2 lbs. 11 oz.; and when dried on the top of a water-bath, for the purpose of getting them brittle and fit for reduction into fine powder, 1 lb. 12 oz. 31 grains. In this state they were submitted as before to analysis, when they yielded in 100 parts:—

Composition of Clover-roots, No. I. (from brow of the hill).

Moisture	4·34
*Organic matter	26·53
Mineral matter	69·13
	100·00

* Containing nitrogen	·816
Equal to ammonia	·991

According to these data an acre of land will yield 3 tons 12 cwts. of nearly dry clover-roots, and in this quantity there will be about 66 lbs. of nitrogen.

The whole of the soil from which the roots had been picked out was passed through a half-inch sieve. The stones left in the sieve weighed 141 lbs.; the soil which passed through weighing 218 lbs.

The soil was next dried by artificial heat, when the 218 lbs. became reduced to 185·487 lbs.

In this partially dried state it contained—

Moisture	4·21
*Organic matter	9·78
†Mineral matter	86·01
	100·00

* Containing nitrogen	·391
Equal to ammonia	·
† Including phosphoric acid	·264

I also determined the phosphoric acid in the ash of the clover-roots. Calculated for the roots in a nearly dry state, the phosphoric acid amounts to ·287 per cent.

An acre of soil, according to the data furnished by the six inches on the spot where the clover was thin, produced the following quantity of nitrogen:—

	Ton.	cwts.	lbs.
In the fine soil..	1	11	33
In the clover-roots	0	0	66
Total quantity of nitrogen per acre ..	1	11	99

The organic matter in an acre of this soil, which cannot be picked out by hand, it will be seen, contains an enormous quantity of nitrogen; and although probably the greater part of the roots and other remains from the clover-crop may not be decomposed so thoroughly as to yield nitrogenous food to the succeeding wheat-crop, it can scarcely be doubted that a considerable quantity of nitrogen will become available by the time the wheat is sown, and that one of the chief reasons why clover benefits the succeeding wheat-crop is to be found in the abundant supply of available nitrogenous food furnished by the decaying clover-roots and leaves.

Clover-Soil No. 2 from the Bottom of the Hill (Good Clover).

A square yard of the soil from the bottom of the hill, where the clover was stronger than on the brow of the hill, produced 2 lbs. 8 oz. of fresh clover-roots, or 1 lb. 11 oz. 47 grains of partially dried roots, 61 lbs. 9 oz. of limestones, and 239·96 lbs. of nearly dry soil.

The partially dried roots contained—

Moisture	5·06
*Organic matter	31·94
Mineral matter	63·00
	100·00

* Containing nitrogen .. .. ·804

An acre of this soil, 6 inches deep, produced 3 tons 7 cwts. 65 lbs. of clover-roots, containing 61 lbs. of nitrogen: that is, there was very nearly the same quantity of roots and nitrogen in them as that furnished in the soil from the brow of the hill.

The roots, moreover, yielded ·365 per cent. of phosphoric acid, or, calculated per acre, 27 lbs.

In the partially dried soil I found—

Moisture	4·70
*Organic matter	10·87
†Mineral matter	84·43
	100·00

* Containing nitrogen .. .. ·405
Equal to ammonia .. .. ·491
† Including phosphoric acid .. .. ·321

According to these determinations an acre of the soil from the bottom of the hill contains—

	Tons.	cwts.	lbs.
Nitrogen in the organic matter of the soil ..	2	2	0
„ clover-roots „ ..	0	0	61
Total amount of nitrogen per acre	2	2	61

Compared with the amount of nitrogen in the soil from the brow of the hill, about 11 cwt. more nitrogen was obtained in the soil and roots from the bottom of the hill where the clover was more luxuriant.

The increased amount of nitrogen occurred in fine root-fibres and other organic matters of the soil, and not in the coarser bits of roots which were picked out by the hand. It may be assumed that the finer particles of organic matter are more readily decomposed than the coarser roots; and as there was a larger amount of nitrogen in this than in the preceding soil, it may be expected that the land at the bottom of the hill, after the removal of the clover, was in a better agricultural condition for wheat than that on the brow of the hill,

Experiments on Clover-Soils from Burcott Lodge Farm, Leighton-Buzzard.

The soils for the next experiments were kindly supplied to me in 1866 by Mr. Robert Vallentine, of Burcott Lodge, who also sent me some notes respecting the growth and yield of clover hay and seed on this soil.

Foreign seed, at the rate of 12 lbs. per acre, was sown with a crop of wheat which yielded 5 quarters per acre the previous year.

The first crop of clover was cut down on the 25th of June, 1866, and carried on June 30th. The weather was very warm from the time of cutting till the clover was carted, the thermometer standing at 80° Fahr. every day. The clover was turned in the swathe on the second day after it was cut; on the fourth day it was turned over and put into small heaps of about 10 lbs. each; and on the fifth day these were collected into larger cocks and then stacked.

The best part of an 11-acre field produced nearly 3 tons of clover-hay, sun-dried, per acre; the whole field yielding on an average $2\frac{1}{2}$ tons per acre. This result was obtained by weighing the stack three months after the clover was carted. The second crop was cut on 21st of August and carried on the 27th, the weight being nearly 30 cwts. of hay per acre. Thus the two cuttings produced just about 4 tons of clover-hay per acre.

The 11 acres were divided into two parts. About one-half was mown for hay a second time, and the other part left for seed. The produce of the second half of the 11-acre field was cut on the 8th of October, and carried on the 10th. It yielded in round numbers 3 cwts. of clover-seed per acre, the season being very unfavourable for clover-seed. The second crop of clover mown for hay was rather too ripe and just beginning to show seed.

A square foot of soil, 18 inches deep, was dug from the second portion of the land which produced the clover-hay and clover-seed.

Soil from part of 11-*acre Field twice mown for Hay.*

The upper 6 inches of soil, 1 foot square, contained all the main roots of 18 strong plants; the next 6 inches only small root-fibres; and in the third section, a 6-inch slice cut down at a depth of 12 inches from the surface, no distinct fibres could be found. The soil was almost completely saturated with rain when it was dug up on the 13th September, 1866:—

		lbs.
The upper 6 inches of soil 1 foot square weighed	.. ..	60
The second 6 " " "	.. ..	61
The third 6 " " "	.. ..	63

These three portions of one foot of soil, 18 inches deep, were dried nearly completely, and weighed again; when the first 6 inches weighed $51\frac{1}{4}$ lbs.; the second 6 inches, 51 lbs. 5 ozs.; and the third section, 54 lbs. 2 ozs.

The first 6 inches contained 3 lbs. of siliceous stones (flints) which were rejected in preparing a sample for analysis; in the two remaining sections there were no large-sized stones. The soils were pounded down and passed through a wire sieve.

The three layers of soil, dried and reduced to powder, were mixed together, and a prepared average sample, when submitted to analysis, yielded the following results.

Composition of Clover-soil, 18 *inches deep, from part of* 11-*acre field, twice mown for hay.*

Soluble in Hydrochloric Acid.	Organic matter		5·86
	Oxides of iron		6·83
	Alumina		7·12
	Carbonate of lime		2·13
	Magnesia		2·01
	Potash		·67
	Soda		·08
	Chloride of sodium		·02
	Phosphoric acid		·18
	Sulphuric acid		·17
Insoluble in Acid.	Insoluble siliceous matter .. 74·61		
	Consisting of:—	Alumina	4·37
		Lime (in a state of silicate)	4·07
		Magnesia	·46
		Potash	·19
		Soda	·23
		Silica	65·29
			99·68

This soil, it will be seen, contained in appreciable quantities not only potash and phosphoric acid, but all the elements of fertility which enter into the composition of good arable land. It may be briefly described as a stiff clay-soil, containing a sufficiency of lime, potash, and phosphoric acid to meet all the requirements of the clover-crop. Originally rather unproductive, it has been much improved by deep culture; by being smashed up into rough clods early in autumn, and by being exposed in this state to the crumbling effects of the air, it now yields good corn and forage crops.

In separate portions of the three layers of soil, the proportions of nitrogen and phosphoric acid contained in each layer of 6 inches were determined and found to be as follows:—

	Soil dried at 212° Fahr.		
	1st, 6 inches.	2nd, 6 inches.	3rd, 6 inches.
Percentage of phosphoric acid	·249	·134	·172
Nitrogen	·162	·092	·064
Equal to ammonia	·198	·112	·078

In the upper 6 inches, as will be seen, the percentage of both phosphoric acid and nitrogen was larger than in the two following layers; while the proportion of nitrogen in the 6 inches of surface soil was much larger than in the next 6 inches; and in the third section, containing no visible particles of root-fibres, only very little nitrogen occurred.

In their natural state the three layers of soil contained—

	1st, 6 inches.	2nd, 6 inches.	3rd, 6 inches.
Moisture	17·16	18·24	16·62
Phosphoric acid	·198	·109	·143
Nitrogen	·134	·075	·053
Equal to ammonia	·162	·091	·064
	lbs.	lbs.	lbs.
Weight of 1 foot square of soil	60	61	63

Calculated per acre, the absolute weight of 1 acre of this land, 6 inches deep, weighs:

	lbs.
1st 6 inches	2,613,600
2nd "	2,657,160
3nd "	2,746,280

No great error, therefore, will be made if we assume in the subsequent calculations that 6 inches of this soil weigh $2\frac{1}{2}$ millions of pounds per acre.

An acre of land, according to the preceding determinations, contains:—

	1st, 6 inches. lbs.	2nd, 6 inches. lbs.	3rd, 6 inches. lbs.
Phosphoric acid	4,950	2,725	3,575
Nitrogen	3,350	1,875	1,325
Equal to ammonia	4,050	2,275	1,600

The proportion of phosphoric acid in 6 inches of surface soil, it will be seen, amounted to about two-tenths per cent.; a proportion of the whole soil, so small that it may appear insufficient for the production of a good corn-crop. However, when calculated to the acre, we find that 6 inches of surface soil, in an acre of land, actually contain over 2 tons of phosphoric acid. An average crop of wheat, assumed to be 25 bushels of grain, at 60 lbs. per bushel, and 3000 lbs. of straw, removes from the land on which it is grown 20 lbs. of phosphoric acid. The clover-soil, analysed by me, consequently contains an amount of phosphoric acid in a depth of only 6 inches, which is equal to that present in $247\frac{1}{2}$ average crops of wheat; or supposing that, by good cultivation and in favourable seasons, the average yield of wheat could be doubled, and 50 bushels of grain at 60 lbs. a bushel and 6000 lbs. of straw could be raised, 124 of such heavy wheat-crops would contain no more phosphoric acid than actually occurred in 6 inches of this clover-soil per acre.

The mere presence of such an amount of phosphoric acid in a soil, however, by no means proves its sufficiency for the production of so many crops of wheat; for, in the first place, it cannot be shown that the whole of the phosphoric acid found by analysis occurs in the soil in a readily available combination: and, in the second place, it is quite certain that the root-fibres of the wheat-plant cannot reach and pick up, so to speak, every particle of phosphoric acid, even supposing it to occur in the soil in a form most conducive to "ready assimilation by the plant."

The calculation is not given in proof of a conclusion which would be manifestly absurd, but simply as an illustration of the enormous quantity, in an acre of soil 6 inches deep, of a constituent forming the smaller proportions of the whole weight of an acre of soil of that limited depth. It shows the existence of a practically unlimited amount of the most important mineral constituents of plants, and clearly points out the propriety of rendering available to plants the natural resources of the soil in plant-food; to draw, in fact, up the mineral wealth of the soil by thoroughly working the land, and not leaving it unutilised as so much dead capital.

The exact determination of phosphoric acid in a soil, it may be observed in passing, is attended with no difficulty, if certain precautions, which it is feared are sometimes neglected by chemists, be taken. I will, therefore, give a brief outline of the plan—commonly known to chemists as the Molybdic acid plan of determining phosphoric acid—which yields accurate results.

Not less than 100 grains, or better 200 grains, of the dried and finely-powdered soil are digested for an hour or thereabouts with 3 or 4 ounces of moderately strong nitric acid. The acid solution is then passed through a filter, and together with the washings from the insoluble portion of the soil left on the filter is evaporated to a small bulk; thus getting rid of the greater part of the acid employed for effecting the solution. During evaporation a large excess of molybdate of ammonia is added to the solution, care being taken to keep it strongly acid.

If there be much phosphoric acid in the soil, a bright yellow precipitate, consisting of molybdic and phosphoric acid, makes its appearance at once; if traces only be present, the yellow precipitate appears only on the concentration of the liquid, after the great excess of nitric acid has been expelled by evaporation. The yellow precipitate containing the whole of the phosphoric acid present in the soil, molybdic acid, together with a little silica, and frequently some oxide of iron, is thrown on a filter and washed with a solution of molybdate of ammonia rendered strongly acid by nitric acid, until a drop of the washings passing through the filter ceases to show a reaction of iron with yellow prussiate of potash solution. It is then dissolved on the filter in an excess of ammonia, and the ammoniacal liquid precipitated with an ammoniacal solution of sulphate of magnesia, which throws down the phosphoric acid as phosphate of magnesia and ammonia. After standing at rest for about 12 hours, the magnesia precipitate is collected on a small filter and washed clean with strong ammonia-water. Together with the phosphoric acid, traces of silica, and generally also traces of oxide of iron, are thrown down with the magnesia precipitate. In order to separate these impurities the precipitate is dissolved in a few

drops of hydrochloric acid, and the acid solution carefully evaporated to complete dryness. The hard, dried residue is again made acid with muriatic acid, a little water is then added, and the liquid passed through a small filter, on which are left insoluble traces of the silica originally thrown down with magnesia. A few drops of citric acid having been added to the acid solution, with a view of keeping any traces of iron in solution, strong ammonia is finally added, which throws down a second time phosphate of magnesia and ammonia, now free from silica and oxide of iron. The precipitate is collected, washed with ammonia-water, dried, burned in a platinum crucible or capsule, weighed, and the phosphoric acid calculated from the weight of the tri-basic phosphate of magnesia left on burning.

Following this plan and the precautions here indicated, the smallest amount of phosphoric acid in a soil can be determined with great precision. If the magnesia precipitate be not redissolved and freed from silica, as pointed out, a higher percentage of phosphoric acid necessarily is obtained than the actual quantity which the soil contains.

Clover-roots.—The roots from 1 square foot of soil were cleaned as much as possible, dried completely at 212°, and in that state weighed 240 grains. An acre consequently contained 1493½ lbs. of dried clover-roots.

The clover-roots contained:—	Dried at 212° Fahr.
*Organic matter	81·33
†Mineral matter (ash)	18·67
	100·00
* Yielding nitrogen	1·635
Equal to ammonia	1·985
† Including insoluble siliceous matter (clay and sand)	11·67

Accordingly the clover-roots, in an acre of land, furnished 24½ lbs. of nitrogen. We have thus:

	Lbs. of Nitrogen.
In the 6 inches of surface soil	3350
In large clover roots	24½
In second inches of soil	1875
Total amount of nitrogen in 1 acre of soil 12 inches deep	5249½
Equal to ammonia	6374½

Or in round numbers 2 tons 6 cwts. of nitrogen per acre, an enormous quantity, which must have a powerful influence in encouraging the luxuriant development of the succeeding wheat-crop, although only a fraction of the total amount of nitrogen in the clover-remains may become sufficiently decomposed in time to be available to the young wheat-plants.

Clover-soil from part of 11-acre Field of Burcott Lodge Farm, Leighton Buzzard, once mown for Hay, and left afterwards for seed.

Produce 2½ tons of clover-hay and 3 cwts. of seed per acre.

This soil was obtained within a distance of 5 yards from the part of the field where the soil was dug up after the two cuttings of hay. After the seed there was some difficulty in finding a square foot containing the same number of large clover-roots as that on the part of the field twice mown; however, at last, in the beginning of November, a square foot containing exactly 18 strong roots was found and dug up to a depth of 18 inches. The soil dug after the seed was much drier than that dug after the two cuttings of hay:—

	lbs.
The upper, 6 inches deep 1 foot square, weighed ..	56
The next " " " ..	58
The 3rd " " " ..	60

After drying by exposure to hot air, the three layers of soil weighed:—

	lbs.
The upper, 6 inches 1 foot square	49¾
The next " "	50½
The 3rd " "	51¼

Equal portions of the dried soil from each 6-inch section were mixed together and reduced to a fine powder. An average sample thus prepared on analysis was found to have the following composition:—

Composition of Clover Soil once mown for Hay, and afterwards left for Seed.

		Dried at 212° Fahr.	
Soluble in Hydrochloric Acid.	Organic matter		5·34
	Oxides of iron		6·07
	Alumina		4·51
	Carbonate of lime		7·51
	Magnesia		1·27
	Potash		·52
	Soda		·16
	Chloride of sodium		·03
	Phosphoric acid		·15
	Sulphuric acid		·19
Insoluble in Acid.	Insoluble siliceous matter	73·84	
	Consisting of:—Alumina		4·14
	Lime (in a state of silicate)		2·69
	Magnesia		·68
	Potash		·24
	Soda		·21
	Silica		65·88
			99·59

This soil, it will be seen, in general character resembles the

preceding sample; it contains a good deal of potash and phosphoric acid, and may be presumed to be well suited to the growth of clover. It contains more carbonate of lime, and is somewhat lighter than the sample from the part of the field twice mown for hay, and may be termed heavy calcareous clay.

An acre of this land, 18 inches deep, weighed when very nearly dry:—

	lbs.
Surface, 6 inches	2,407,900
Next "	2,444,200
3rd "	2,480,500

Or in round numbers every 6 inches of soil weighed per acre $2\frac{1}{2}$ millions of pounds, which agrees tolerably well with the actual weight per acre of the preceding soil.

The amount of phosphoric acid and nitrogen in each 6-inch layer was determined separately as before, when the following results were obtained:—

	In Dried Soil.		
	1st, 6 inches.	2nd, 6 inches.	3rd, 6 inches.
Percentage of phosphoric acid ..	·159	·166	·140
Phosphoric acid	·189	·134	·089
Equal to ammonia	·229	·162	·108

An acre, according to these determinations, contains in the three separate sections:—

	1st, 6 inches. lbs.	2nd, 6 inches. lbs.	3rd, 6 inches. lbs.
Phosphoric acid	3975	4150	3500
Nitrogen	4725	3350	2225
Equal to ammonia	5725	4050	2700

Here again, as might naturally be expected, the proportion of nitrogen is largest in the surface where all the decaying leaves dropped during the growth of the clover for seed are found, and wherein root-fibres are more abundant than in the lower strata. The first 6 inches of soil, it will be seen, contained in round numbers $2\frac{1}{4}$ tons of nitrogen per acre, that is, considerably more than was found in the same section of the soil where the clover was mown twice for hay; showing plainly that during the ripening of the clover-seed the surface is much enriched by the nitrogenous matter in the dropping leaves of the clover-plant.

Clover-roots.—The roots from 1 square foot of this soil, freed as much as possible from adhering soil, were dried at 212°, and when weighed and reduced to a fine powder, gave on analysis the following results:—

*Organic matter	64·76
†Mineral matter	35·24
	100·00
* Containing nitrogen	1·702
Equal to ammonia..	2·066
† Including clay and sand (insoluble siliceous matter)	26·04

A square foot of this soil produced 582 grains of dried clover-roots, consequently an acre yielded 3622 lb. of roots, or more than twice the weight of roots obtained from the soil of the same field where the clover was twice mown for hay.

In round numbers, the 3622 lb. of clover-roots from the land mown once, and afterwards left for seed, contained 51½ lb. of nitrogen.

The roots from the soil after clover-seed, it will be noticed, were not so clean as the preceding sample, nevertheless, they yielded more nitrogen. In 64·76 of organic matter we have here 1·702 of nitrogen, whereas in the case of the roots from the part of the field where the clover was twice mown for hay, we have in 81·33 parts—that is, much more organic matter, and 1·635, or rather less of nitrogen. It is evident, therefore, that the organic matter in the soil after clover-seed occurs in a more advanced stage of decomposition than found in the clover-roots from the part of the field twice mown. In the manure in which the decay of such and similar organic remains proceeds, much of the non-nitrogenous or carbonaceous matters of which these remains chiefly, though not entirely consist, is transformed into gaseous carbonic acid, and what remains behind becomes richer in nitrogen and mineral matters. A parallel case, showing the dissipation of carbonaceous matter, and the increase in the percentage of nitrogen and mineral matter in what is left behind, is presented to us in fresh and rotten dung; in long or fresh dung the percentage of organic matter, consisting chiefly of very imperfectly undecomposed straw, being larger, and that of nitrogen and mineral matter smaller, than in well-rotted dung.

The roots from the field after clover seed, it will be borne in mind, were dug up in November, whilst those obtained from the land twice mown, were dug up in September; the former, therefore, may be expected to be in a more advanced state of decay than the latter, and richer in nitrogen.

In an acre of soil after clover-seed, we have—

	lbs.
Nitrogen in 1st 6 inches of soil	4725
Nitrogen in roots	51½
Nitrogen in 2nd 6 inches of soil	3350
Total amount of nitrogen per acre in 12 inches of soil	8126½
Equal to ammonia	9867

or in round numbers 3 tons and 12½ cwts. of nitrogen per acre, equal to 4 tons 8 cwts. of ammonia.

This is a very much larger amount of nitrogen than occurred in the other soil, and shows plainly that the total amount of nitrogen accumulates, especially in the surface soil, when clover

is grown for seeds; thus explaining intelligibly, as it appears to me, why wheat, as stated by many practical men, succeeds better on land where clover is grown for seed than where it is mown for hay.

All the three layers of the soil after clover-seed are richer in nitrogen than the same sections of the soil where the clover was twice mown, as will be seen by the following comparative statement of results.

	I. Clover-soil twice Mown.			II. Clover-soil once Mown, and then left for Seed.		
	Upper 6 inches.	2nd 6 inches.	3rd 6 inches.	Upper 6 inches.	Next 6 inches.	Lowest 6 inches.
Percentage of nitrogen in dried soil ..	·168	·092	·064	·189	·134	·089
Equal to ammonia ..	·198	·112	·078	·229	·162	·108

This difference in the amount of accumulated nitrogen in clover-land appears still more strikingly on comparing the total amounts of nitrogen per acre in the different sections of the two portions of the 11-acre fields:—

Percentage of nitrogen per acre:—	1st 6 inches. lbs.	2nd 6 inches. lbs.	3rd 6 inches. lbs.
*I. In soil, clover twice over	3350	1875	1325
†I. In soil, clover once mown and seeded afterwards	4725	3350	2225
Equal to ammonia:—			
* I. Clover twice mown	4050	2275	1600
† II. Clover seeded	5725	4050	2700
I. Nitrogen in roots of clover twice mown	24½		
II. Nitrogen in clover, once mown and grown for seed afterwards	51½		
I. Weight of dry roots per acre from Soil I.	1493½		
II. Weight of dry roots per acre from Soil II.	3622		
*Total amount of nitrogen in 1 acre 12 inches deep of Soil I.	5249½		
†Total amount of nitrogen in 1 acre 12 inches deep of Soil II.	8126½		
* Equal to ammonia	6374½		
† Equal to ammonia	9867		
Excess of nitrogen in an acre of soil 12 inches deep calculated as ammonia in part of field mown once and then seeded	3592½		

It will be seen that not only was the amount of large clover-roots greater in the part where clover was grown for seed, but that likewise the different layers of soil were in every instance

richer in nitrogen after clover-seed than after clover mown twice for hay; or as it may be expressed:—In 1 lb. of ammonia there were 3592° more of ammonia in the land where clover-seed was grown than where other clover was made entirely into hay; or the former part of the same field produced rather more than half the total quantity of nitrogen yielded by the latter.

Reasons are given in the beginning of this paper which it is hoped will have convinced the reader that the fertility of land is not so much measured by the amount of ash-constituents of plants which it contains, as by the amount of nitrogen which, together with an excess of such ash-constituents, it contains in an available form. It has been shown likewise that the removal from the soil of a large amount of mineral matter in a good clover-crop, in conformity with many direct field experiments, is not likely in any degree to affect the wheat-crop, and that the yield of wheat on soils under ordinary cultivation, according to the experience of many farmers, and the direct [and numerous experiments of Messrs. Lawes and Gilbert, rises or falls, other circumstances being equal, with the supply of available nitrogenous food which is given to the wheat. This being the case, we cannot doubt that the benefits arising from the growth of clover to the succeeding wheat are mainly due to the fact that an immense amount of nitrogenous food accumulates in the soil during the growth of clover.

This accumulation of nitrogenous plant-food, specially useful to cereal crops, is, as shown in the preceding experiments, much greater when clover is grown for seed than when it is made into hay. This affords an intelligible explanation of a fact long observed by good practical men, although denied by others who decline to accept their experience as resting on trustworthy evidence, because, as they say, land cannot become more fertile when a crop is grown upon it for seed which is carried off, than when that crop is cut down and the produce consumed on the land. The chemical points brought forward in the course of this inquiry show plainly that mere speculations as to what can take place in a soil and what not, do not much advance the true theory of certain agricultural practices. It is only by carefully investigating subjects like the one under consideration that positive proofs are given showing the correctness of intelligent observers in the fields. Many years ago I made a great many experiments relative to the chemistry of farmyard-manure, and then showed, amongst other particulars, that manure, spread at once on the land, need not there and then be ploughed in, inasmuch as neither a broiling sun nor a sweeping and drying wind will cause the slightest loss of ammonia, and that, therefore, the old-fashioned farmer who carts his manure on the land as soon

as he can, and spreads it at once, but who ploughs it in at his convenience, acts in perfect accordance with correct chemical principles involved in the management of farmyard-manure. On the present occasion my main object has been to show, not merely by reasoning on the subject, but by actual experiments, that the larger the amounts of nitrogen, potash, soda, lime, phosphoric acid, &c., which are removed from the land in a clover-crop, the better it is, nevertheless, made thereby for producing in the succeeding year an abundant crop of wheat, other circumstances being favourable to its growth.

Indeed no kind of manure can be compared in point of efficacy for wheat to the manuring which the land gets in a really good crop of clover. The farmer who wishes to derive the full benefit from his clover-lay, should plough it up for wheat as soon as possible in the autumn, and leave it in a rough state as long as is admissible, in order that the air may find free access into the land, and the organic remains left in so much abundance in a good crop of clover be changed into plant-food; more especially, in other words, in order that the crude nitrogenous organic matter in the clover-roots and decaying leaves may have time to become transformed into ammoniacal compounds, and these in the course of time into nitrates, which I am strongly inclined to think is the form in which nitrogen is assimilated, par excellence, by cereal crops, and in which, at all events, it is more efficacious than in any other state of combination wherein it may be used as a fertiliser.

When the clover-lay is ploughed up early, the decay of the clover is sufficiently advanced by the time the young wheat-plant stands in need of readily available nitrogenous food, and this, being uniformly distributed through the whole of the cultivated soil, is ready to benefit every single plant. This equal and abundant distribution of food, peculiarly valuable to cereals, is a great advantage, and speaks strongly in favour of clover as a preparatory crop for wheat.

Nitrate of soda, an excellent spring top-dressing for wheat and cereals in general, in some seasons fails to produce as good an effect as in others. In very dry springs the rainfall is not sufficient to wash it properly into the soil and to distribute it equally, and in very wet seasons it is apt to be washed either into the drains or into a stratum of the soil not accessible to the roots of the young wheat. As therefore the character of the approaching season cannot usually be predicted, the application of nitrate of soda to wheat is always attended with more or less uncertainty.

The case is different when a good crop of clover-hay has been obtained from the land on which wheat is intended to be grown

afterwards. An enormous quantity of nitrogenous organic matter, as we have seen, is left in the land after the removal of the clover-crop; and these remains gradually decay and furnish ammonia, which at first and during the colder months of the year is retained by the well-known absorbing properties which all good wheat-soils possess. In spring, when warmer weather sets in, and the wheat begins to make a push, these ammonia compounds in the soil are by degrees oxidized into nitrates; and as this change into food, peculiarly favourable to young cereal plants, proceeds slowly but steadily, we have in the soil itself, after clover, a source from which nitrates are continuously produced; so that it does not much affect the final yield of wheat whether heavy rains remove some or all of the nitrate present in the soil. The clover-remains thus afford a more continuous source from which nitrates are produced, and greater certainty for a good crop of wheat than when recourse is had to nitrogenous top-dressings in the spring.

The remarks respecting the formation of nitrates in soils upon which clover has been grown, it should be stated, do not emanate from mere speculations, but are based on actual observations.

I have not only been able to show the existence of nitrates in clover-soils, but have made a number of actual determinations of the amount of nitric acid in different layers of soils on which clover had been grown; but as this paper has grown already to greater dimensions than perhaps desirable, I reserve any further remarks on the important subject of nitrification in soils for a future communication.

Summary.

The following are some of the chief points of interest which I have endeavoured fully to develope in the preceding pages:—

1. A good crop of clover removes from the soil more potash, phosphoric acid, lime, and other mineral matters, which enter into the composition of the ashes of our cultivated crops, than any other crop usually grown in this country.

2. There is fully three times as much nitrogen in a crop of clover as in the average produce of the grain and straw of wheat per acre.

3. Notwithstanding the large amount of nitrogenous matter and of ash constituents of plants in the produce of an acre, clover is an excellent preparatory crop for wheat.

4. During the growth of clover a large amount of nitrogenous matter accumulates in the soil.

5. This accumulation, which is greatest in the surface-soil, is due to decaying leaves dropped during the growth of clover,

and to an abundance of roots, containing when dry from $1\frac{3}{4}$ to 2 per cent. of nitrogen.

6. The clover-roots are stronger and more numerous, and more leaves fall on the ground when clover is grown for seed, than when it is mown for hay; in consequence more nitrogen is left after clover-seed than after hay, which accounts for wheat yielding a better crop after clover-seed than after hay.

7. The development of roots being checked when the produce, in a green condition, is fed off by sheep, in all probability leaves still less nitrogenous matter in the soil than when clover is allowed to get riper and is mown for hay; thus, no doubt, accounting for the observation made by practical men that, notwithstanding the return of the produce in the sheep-excrements, wheat is generally stronger and yields better, after clover mown for hay, than when the clover is fed off green by sheep.

8. The nitrogenous matters in the clover-remains on their gradual decay are finally transformed into nitrates, thus affording a continuous source of food, on which cereal crops specially delight to grow.

9. There is strong presumptive evidence that the nitrogen which exists in the air in the shape of ammonia and nitric acid, and descends in these combinations with the rain which falls on the ground, satisfies, under ordinary circumstances, the requirements of the clover-crop. This crop causes a large accumulation of nitrogenous matters, which are gradually changed in the soil into nitrates. The atmosphere thus furnishes nitrogenous food to the succeeding wheat indirectly, and, so to say, gratis.

10. Clover not only provides abundance of nitrogenous food, but delivers this food in a readily available form (as nitrates) more gradually and continuously, and consequently with more certainty of a good result, than such food can be applied to the land in the shape of nitrogenous spring top-dressings.

Laboratory, 11, *Salisbury-square, Fleet-street, E.C.*
July, 1868.

XXVII.—*On the Cultivation of Waste Lands on Mountain-sides.* By J. A. Slater.

In discussing the question how moorlands can be rendered productive, it should be stated at the outset that if situated at very high elevations above the level of the sea, it is questionable whether their cultivation can ever be rendered remunerative.

The barren moorland, whose cultivation I am about to describe, lies at an elevation of some 750 feet; and is therefore not in the most favourable climate for agricultural purposes. The soil of

this tract is extremely barren, and in its natural state not worth a rental of one shilling per acre. It consists of a mixture of numerous earthy ingredients, every one of which is totally infertile; coarse red sand, alternating with a light gray sand, coming up quite to the surface. In some places a black earth, an inch or two deep, is found, whilst running through the whole are many gritstones, some of enormous dimensions. Over the whole is spread a short, stunted growth of heath, though in some places the land is too poor to grow even heath or moss. Such is the unpromising nature of the soil to be worked upon.

First. It is desirable that, in accordance with the practice usually adopted in North Staffordshire, but close to Cheshire, the moorland intended to be cultivated should be divided into square fields of four or five acres each, though fields of eight or nine acres in extent may be found where nothing but heath or gorse once grew. As stones are close at hand and plentiful, and the cost of conveyance little or nothing, the cheapest and most effectual method for inclosing the fields is by a stone wall; which, if well built to commence with, will continue good for generations without further expenditure or care; the original cost being sixpence per lineal yard, more or less, according to the way in which the work is done.

When the land is properly inclosed, the next process commences with digging or trenching, and clearing it of stones; a work generally designated by the term "ridding." This "ridding" is effected in two or three ways. The usual method is, after making a trench twelve inches in depth, to put the surface soil with the heath attached, at the bottom of the trench, and then to cover it up by the still more barren subsoil. The surface heath-clod is thus buried to the depth of 8 to 12 inches, and left there for years to rot. The cost of "ridding" to the depth of 12 inches is usually from 2*s.* to 2*s.* 6*d.* per Cheshire rood of 64 square yards (8 × 8), which would be equivalent to 8*l.* or 9*l.* per statute acre; if less than 12 inches deep the cost will be less, but never under 1*s.* per 64 square yards. This method of ridding, however, I do not approve, as I may have occasion hereafter to mention.

The first crop usually grown, after the clearing has been effected, is a green crop, such as potatoes or turnips; for my own part I give the preference to the former, as the produce of potatoes is much more satisfactory than that of turnips grown on the newly turned-up soil. In the year 1867 the potatoes grown on 15 roods of land of 64 square yards to the rood, yielded 7 loads of 240 lbs. to the load, all sound, as they usually are on fresh ridded ground; whereas the turnips grown in the same field yielded not more than 5 or 6 tons per acre.

The method of ridding above described is that usually adopted, but experience has taught me that instead of burying the surface heath-soil it is far better to retain it on the surface. At the same time the subsoil should be effectively stirred and cleared of stones to the depth of 12 inches. This is a process readily understood and easily taught to a workman by an experienced person. By this means the surface soil, weak and comparatively barren though it be (yet much superior to the complete barrenness of the subsoil), is kept on the surface ready for immediate use. The modicum of fertility, which by very slow degrees has been increasing for ages, may thus by cultivation be turned to immediate advantage, if the few fertile earthy ingredients, found on the surface, be retained thereon to work with. The sterile subsoil should not be brought to the surface too freely, but rather incorporated gradually, as if the contrary practice be followed, the result is certain to be injurious. In a four-acre field, where formerly nothing but heath grew, I tried the experiment, on one acre, of mixing too much of the lower with the upper soil, and the consequence was a diminution of 50 per cent. at least in the value of the subsequent crop, as compared with that on other parts in the same field. In opposition, therefore, to the usual practice, and to what is now being done (February, 1868) not a mile from where I am writing, I consider it to be extremely desirable, in "ridding" heath-land, to keep the surface soil on the surface, and to stir the subsoil to the depth of 12 inches. Indeed I have found that by pursuing this plan, the corn and root crops are greater in after years, the grass is greener, and far less manure is required to bring the land into profitable condition.

Moreover it is highly important that the stirring and ridding should not only be of the required depth, but done effectually, and the moorland thoroughly broken, otherwise the subsequent crops will seriously suffer. A five-acre field in my occupation affords a complete exemplification of this truth. The ridding of this field has been ineffectually done, the work varying in depth from 3½ to 12 inches, and the growing crop of oats indicates precisely how the work has been executed. In one part of the field the oats "yellow off;" in another, the produce is less than 10 bushels to the acre; whilst in a third part of the same field where the ridding has been thoroughly effected, the crops are most satisfactory, reaching 40 bushels per acre with an abundance of nutritious straw.

Experience has demonstrated most satisfactorily to myself that where the ridding has been conscientiously performed, no land will pay better as arable land, and that where the ridding

has been incomplete no land, as arable land, will pay worse; in fact, the plough cannot enter it at all without certain loss.

The rotation most profitable to be adopted will depend upon the length of time that has elapsed since the ridding was completed. But for ten or twelve years after the heath-ground has been cleared I would follow the four-course shift for the following reasons: First, because in the newly recovered heath-ground there is hardly any such thing as "clover sickness," and the crops of clover are enormous; and secondly, because frequent cultivation and *aeration* seem to be beneficial, the air exerting a wonderful influence upon the newly broken-up heath-ground.

In the first years the rotation would therefore be:—1. Turnips or potatoes. 2. Barley or oats. 3. Clover. 4. Barley or oats. On the clover showing a tendency to fail, as it would after a certain number of years, I would adopt the five-course system, keeping the seeds down two years. After cultivation and aeration have done their proper work, I would finally have recourse to the six-course system, keeping the seeds down three years. This plan I would ultimately and steadily follow for several reasons: First, because the clover and other seeds will never fail; second, because the yield of grass available for pasture in the second and third years will be more than double what it would be, if allowed to lie in permanent pasture; and lastly, because the ground is greatly invigorated for future corn and root crops, by being allowed to remain in grass for three years. After this, the pasturing power of the worn-out seeds diminishes rapidly, and they require to be ploughed up again to recommence the rotation. Under this system every crop will be abundant, none will fail, and the ground will be progressively improved.

It may be worthy of mention that last year I had the curiosity to weigh a crop of turnips, the growth of 1867. I weighed three drills of swedes, 100 yards in length. The first drill gave 6 cwt. 3 qrs. 2 lbs., the second exactly the same, and the third 7 cwt. From this it may be readily calculated that the crop of swedes of 1867 was over 21 tons per imperial acre, while the yellow Tankard turnips, grown in the same field, were over 28 tons per acre. Surely these will be considered satisfactory crops, more especially when it is remembered that they were grown with artificial manure alone, and that too on land where nothing but heath formerly grew. The crop of potatoes of 1867 was not equal to that in former years, but those sold before Christmas last realised upwards of 20*l.* per acre.

In 1864 I attempted to grow a crop of potatoes that might be considered a maximum, at least upon heath-land. This experiment I tried upon 2 acres, and the yield appears almost incre-

dible; the first acre giving 10 tons, and the second over 11 tons, or 99 loads, of 252 lbs. to the load. These results, however, were only obtained by extra preparation and by incurring extra expense.

Where a field has been imperfectly cleared or not ridded to the required depth, the corn on it will grow *in patches*, one part of the field giving a full crop, whilst another will yield little or nothing. This consideration subtracts considerably from the value of the land, and from the desirability of devoting it to arable culture.

But it is not to crops of corn that one looks for much profit; it is rather to the turnips and potatoes, the clover and grass, which are cultivated as well as corn. Last year (1867) in a four-acre field I grew upwards of 3 tons of clover-hay per acre—the result of two cuttings. This at the present price of clover hay is equivalent to 14*l.* or 15*l.* per acre, whereas last April the price in this neighbourhood was 6*l.* per ton. This result must be considered very satisfactory as regards the clover-crop in a field which formerly produced nothing but heath. The clover-crop, however, is not so much affected by imperfect ridding as the corn crops are,—a fact which is manifestly indicated by the less uneven appearance of the growing clover.

In these high districts, lying at an elevation of almost 800 feet above the level of the sea, it is very advantageous to have belts of planting on the north and the east of the estate under cultivation. Larch and Scotch firs planted in alternate rows, some 20 to 30 yards in width are an effectual protection against the cold and fierce winds that otherwise would sometimes blow very injuriously. On the south side of one of these plantings in heath-ground, at an elevation of 800 feet above the sea-level, I have grown mangolds 14 lbs. each, 8 of them weighing a cwt. Indeed, plantations judiciously arranged, besides giving indispensable shelter to cattle, when the fields are in grass, afford an advantage equal to, at least, 2° or 3° of latitude in their effects on the growing crops. These mountain-sides are much exposed to cruel winds, which sometimes inflict serious injury on the ripening corn. I once had a field of ripe barley half-thrashed by the fury of the winds; but with the protection afforded by plantations this calamity can never occur.

Where the ground is very uneven, irregular, and worked with difficulty, by far the most profitable plan is to lay it down in grass, and let it remain in meadow or permanent pasture.

Many years ago, a labouring man, in this neighbourhood procured for a trifle a piece of waste valueless ground, 5¾ acres in extent, and 800 feet above the level of the sea. On this he with

his own hands built for himself a hovel of a house, all of stones, which he found lying around. He then set about ridding the ground, which he did effectually, using no other instruments than his spade and mattock. As soon as possible he laid it down in grass, which maintained for him two milking cows, with a stirk, summer and winter. On this the worthy man lived in simple independence till he died some five or six years ago at the age of eighty. The $5\frac{3}{4}$ acres were then put up for sale by auction, and the property realised 330*l.* to be divided amongst the old man's children, all of whom are prosperous and far above want.

On land like that I am describing, when devoted to arable cultivation, and under a judicious rotation of cropping, I have found it extremely advantageous (after the corn is cut) to depasture "the seeds" in the autumn. Heath land seems to be peculiarly adapted for the growth of the artificial grasses, and if the ground has been properly laid down, "the seeds" show wonderful vitality after the field has been cleared of the corn. In the autumn of 1865, I turned 20 yearly calves and "twinters"—as two-year-old animals are locally termed—into a 6-acre field newly laid down with grass seeds. The field maintained the calves in a growing condition from October 31st to November 21st, exactly three weeks. This result is not inconsiderable in a field where nothing but heath once grew, and at an elevation of more than 800 feet above the sea level. But the greatest benefit is derived from *treading* the seeds by the calves and twinters, inasmuch as by this means the ground becomes consolidated, and the seeds fastened as it were in the light ground so as to be enabled to stand the ensuing winter, however inclement. By this treatment the crop of clover in the following season is not diminished, but, according to my experience, frequently very much increased. Hence I have found a double profit in treading the seeds by young stock.

Before concluding I would just observe that the storm of wind that occurred on the first day of the present month, February 1868, afforded a complete demonstration of the utility of having belts of planting on high ground. At Eccles, 3 or 4 miles, north of Manchester, the pressure of the wind was 31 lbs. on the square foot, whilst on high ground 24 miles distant, at Bidston Hill Observatory, it was 70 lbs. Thus the force of the wind on high ground is more than two-fold greater than it is on low ground. Hence may be inferred the great importance of plantations when the breaking up of mountain lands is attempted.

It has been shown, I think, with sufficient distinctness that the subduing of the barren wastes, and reducing them to fertility, is a speculation that will pay, even when the climate is adverse,

and the elevation as much as 1000 feet above the level of the sea; much more, therefore, will the enterprise be successful when the conditions are more favourable, and the climate less unpropitious. But independently of the gains, which are very considerable—amounting sometimes to as much as 50 per cent., and even more—arising from the judicious cultivation of the barren heath, there is a consolation in knowing that every acre effectually won from the waste or the wilderness adds so much to the national resources, and increases the value of the property immediately adjoining it.

Heaton House, Rushton, near Macclesfield.

XXVIII.—*Statistics of Live Stock and Dead Meat for Consumption in the Metropolis* By Robert Herbert.

Although there was a decided falling off in the imports of foreign stock during the first six months of the present year, when compared with the corresponding periods in 1866 and 1867, the general condition of the beasts and sheep at hand was good; consequently the deficiency in the supply of imported food was comparatively trifling. During the greater portion of the season some remarkably fine stock was received in the metropolis from Norfolk, Suffolk, &c.; but towards its close the weight and condition of both beasts and sheep, arising from the severe drought in all parts of England, and the great scarcity of pasture-food, fell off considerably. The season, therefore, closed badly. The graziers in Lincolnshire, Leicestershire, and Northamptonshire have, however, suffered severely. The drought wholly prevented them from finishing off their beasts, and many of them, owing to the scarcity of food, were compelled in July to sell large numbers of beasts in very little more than a half-fat state. The almost total failure of the turnip-crop, and the moderate yield of the new barley and oats, have led to the inference that meat, especially that of fine quality, will be very high in price during the last three months of the present year.*

The enormous growth of swedes in 1867 has been a great boon to cattle-feeders; indeed, the cowkeepers of London—who were well supplied with swedes till the end of July—would

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* Fortunately, the country has been visited by some splendid rains, the growth of grass has been somewhat rapid, the potato-crop has shown signs of improvement, and there is every prospect of a full average growth of white turnips.—*August 18th.*

have found it a matter of great difficulty to keep their cows alive had it not been for the splendid crop of roots grown in this country last year. Although the restrictions compelling all cattle exhibited in the Metropolitan Market to be slaughtered within the four-mile radius from Charing Cross continue in force, the trade throughout has been steady, and the fluctuations in prices have been unimportant. Prime Scots and crosses were 2*d.* per 8 lbs. dearer at the close than at the commencement of the first half of the present year. The general top quotation has been 5*s.* per 8 lbs. The arrivals of dead meat from Continental ports have been on a very limited scale; indeed, this branch of the trade, which formerly occupied a rather important position, appears to have sunk into comparative insignificance, so trifling have the receipts lately been.

Although the imports have been diminished by more than one-half, the supply of sheep exhibited has been fully equal to the number last year; but the quality of nearly all breeds, arising from the scarcity of food, has shown a considerable deficiency. Prime breeds have, therefore, been in improved request at advanced rates; but inferior sheep have moved off slowly. The large quantities of meat brought forward in Newgate and Leadenhall have prevented a serious rise in the quotations. The best Downs and half-breds, in the wool, have sold at from 5*s.* 2*d.* to 5*s.* 4*d.*; out of the wool, 4*s.* 6*d.* to 4*s.* 8*d.* per 8 lbs.

A large number of English lambs have been on offer, but only moderate receipts of foreign. The trade has been fairly active. At the opening of the season prices ranged from 8*s.* to 9*s.*, but they soon receded to 5*s.* 6*d.* to 7*s.* per 8 lbs.

The supply of calves has been somewhat limited; nevertheless sales have progressed slowly at from 4*s.* to 5*s.* 4*d.* per 8 lbs.

For prime small pigs there has been a healthy inquiry at full currencies; otherwise the market has ruled heavy, and the quotations have been drooping. The highest price has been 4*s.* 4*d.* per 8 lbs.

The hay crop has been very small throughout the country, but its quality has been good. The root-crops having proved a complete failure, a strong demand has sprung up for artificial food, and a good business has been transacted in linseed, rapeseed, and oilcakes, at advancing prices. The probable scarcity of fat stock during the winter has also caused more firmness to prevail in the tallow-market. The price of rough fat has advanced to 2*s.* 2½*d.* per 8 lbs.

The total supplies of stock exhibited in the Metropolitan Cattle Market during the six months were as under:—

Total Supplies of Stock Exhibited.

	Beasts.	Cows.	Sheep and Lambs.	Calves.	Pigs.
1861	109,812	3,005	604,650	6,560	15,952
1862	116,735	3,054	631,672	8,259	17,407
1863	120,045	3,005	628,072	10,449	16,435
1864	131,694	3,014	622,330	9,935	17,679
1865	130,977	3,086	614,766	12,189	16,028
1866	107,816	1,220	677,560	6,721	12,953
1867	108,180	1,400	674,670	8,468	11,200
1868	108,380	990	789,250	8,729	10,145

From our own grazing districts the receipts have been liberal, and have quite come up to previous years in number. The condition of the Irish stock has been inferior. The annexed Table shows the actual numbers arrived in the Metropolitan Market:—

District Bullock Arrivals.

	Northern Districts.	Eastern Districts.	Other parts of England.	Scotland.	Ireland.
1860	4,000	68,520	21,420	5,033	1,477
1864	..	62,170	19,980	9,918	2,740
1865	1,000	54,460	17,570	11,797	2,517
1866	5,290	31,188	12,680	8,800	3,000
1867	400	36,630	14,110	5,632	903
1868	1,000	47,800	18,329	5,842	3,206

Average Prices of Beef and Mutton in the Six Months.

BEEF.—Per 8 lbs. to sink the Offal.

	1862.	1863.	1864.	1865.	1866.	1867.	1868.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Inferior ..	3 0	3 4	3 6	3 8	3 10	3 4	3 0
Middling ..	4 0	4 4	4 6	4 8	4 10	4 4	4 0
Prime ..	4 8	5 0	5 0	5 2	5 10	5 0	5 0

MUTTON.—Per 8 lbs. to sink the Offal.

	1862.	1863.	1864.	1865.	1866.	1867.	1868.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Inferior ..	3 6	3 10	3 8	4 4	4 0	3 6	3 2
Middling ..	4 6	4 8	4 6	4 10	5 4	4 6	4 2
Prime ..	5 4	5 6	5 2	5 10	6 0	5 0	5 2

The above figures show that prime stock has, this year, been very firm in price; but that a decline has taken place in the value of inferior animals, caused by the very middling condition in which they were exhibited.

The total imports of foreign stock into London have amounted to 112,790 head, against 248,212 in 1867, being a decline of 135,422 head. The following Table shows the ports from whence shipments took place, together with the actual numbers shipped :—

Imports in the first Six Months.

From	Beasts.	Sheep and Lambs.	Calves.	Pigs.
Aalborg..	111	41	..	..
Amsterdam	..	669	..	..
Antwerp	1,748	6,147	1,530	21
Barcelona	150	..	..	..
Bilboa	126	..	..	..
Boulogne	12	31	..	..
Bremen	221	4,325	..	..
Cadiz	91	..	..	..
Corunna	730	..	..	..
Geestemunde	5,159	5,918	29	21
Gibraltar	611	..	..	..
Gothenburg	892	1,372	36	..
Hamburg	1,922	24,101	26	597
Harlingen	6,399	13,237	839	216
Königsberg	17	..	..	..
Malaga	80	..	..	..
Marseilles	40	..	..	..
Medemblik	..	4,878	..	..
Nieu Diep	..	5,279	..	..
Oporto	1,279	..	..	..
Ostend	128	471	268	161
Pillau	5	..	..	..
Randers..	329	123	..	..
Randorf	220	14	..	..
Rotterdam	3,088	13,159	4,110	658
Vigo	1,065	..	..	..
Total	24,423	79,765	6,838	1,674

At the corresponding periods in previous years the imports into London were as follows :—

Imports at Corresponding Periods.

	Beasts.	Sheep and Lambs.	Calves.	Pigs.
1860	17,193	76,415	7,965	2,492
1861	22,045	46,674	6,187	4,309
1862	11,462	49,332	9,459	883
1863	16,701	91,206	11,445	1,229
1864	29,460	85,920	10,392	14,212
1865	40,921	122,579	9,993	32,582
1866	46,343	180,460	7,480	10,702
1867	45,994	188,997	8,277	4,944

The returns issued by the Board of Trade give the following imports of foreign stock into the United Kingdom in six months:—

	1866.	1867.	1868.
Oxen, Bulls, and Cows	72,812	69,110	39,136
Calves	9,122	11,558	11,344
Sheep	406,888	291,031	171,320
Lambs..	4,841	5,447	9,699
Pigs	29,873	13,776	8,405

The supplies of meat at Newgate and Leadenhall, although almost entirely composed of the carcases of home-fed beasts, have been extensive. Generally speaking the trade has been quiet, and prices have been easy. Beef has sold at from 2*s.* 10*d.* to 4*s.* 8*d.*; mutton, 2*s.* 10*d.* to 4*s.* 10*d.*; lamb, 4*s.* to 6*s.* 8*d.*; veal, 3*s.* 4*d.* to 4*s.* 8*d.*; and pork, 2*s.* 10*d.* to 4*s.* 6*d.* per 8 lbs. by the carcase.

The high prices at which both beasts and sheep are selling throughout the Continent, but more especially in France and Holland, the failure of our root-crops, and the scarcity of hay, lead to the conclusion that really prime meat will maintain its present price for several months. Inferior stock, from the large consumption going on, is likely to command strong quotations during the remainder of the year.

The Wool Trade.

In the early part of the year, notwithstanding the high duties levied upon woollen goods in the United States, there was an improved feeling in the wool trade generally. Prices of colonial wool, arising from the large quantities taken by Continental houses, were on the advance. Since then, however, as the imports have been on a very large scale, the quotations have

given way 1*d.* to 3*d.* per lb.; the quantity of colonial wool advertised for the July sales amounting to 226,000 bales—a quantity greatly in excess of all previous years. The new clip of English wool has turned out very large and of unusually fine quality. Yet prices, in comparison with Colonial, have not suffered materially, although the want of orders for woollen goods for export has been much complained of. The annexed return shows the

Imports of Wool in Six Months.

	1866.	1867.	1868.
	lbs.	lbs.	lbs.
Colonial and Foreign ..	101,948,949	117,220,028	96,458,474

Exports of Wool in Six Months.

	1866.	1867.	1868.
	lbs.	lbs.	lbs.
English	3,566,886	3,117,235	5,012,579
Colonial	29,451,959	39,626,742	49,079,923
Foreign	2,540,984	6,035,779	2,202,718
Total	35,559,829	48,779,756	56,295,220

The following are the current prices of home-grown wool in London compared with those of the same period in 1867:—

	1867. Per 240 lbs.					1868. Per 240 lbs.				
Fleeces:—	£.	s.		£.	s.	£.	s.		£.	s.
Southdown hoggetts	16	10	to	17	0	15	0	to	16	0
Half-bred hoggetts	17	10	to	18	0	16	10	to	17	0
Kent fleeces	17	0	to	17	10	15	10	to	16	0
Southdown ewes and wethers	15	0	to	16	0	14	10	to	15	10
Leicester ditto	16	0	to	17	0	15	0	to	15	10
Sorts:—										
Clothing and picklock	18	0	to	18	10	17	10	to	18	0
Prime	16	10	to	17	0	16	0	to	16	10
Choice	15	10	to	16	0	15	0	to	16	0
Super	14	0	to	15	0	14	0	to	15	0
Combing:—										
Wether matching	19	0	to	19	10	18	0	to	18	10
Picklock	16	0	to	17	0	14	10	to	15	10
Common	14	0	to	15	0	12	0	to	13	0
Hog matching	20	0	to	20	10	18	0	to	18	10
Picklock matching	16	0	to	17	0	14	10	to	15	10
Super ditto	14	0	to	15	0	12	0	to	13	0

The above comparison of prices shows that the value of sorts has been fairly supported, but that fleeces and most descriptions

of combing wool have this year given way from 1*d.* to fully 1½*d.* per lb. The severe pressure of colonial wools upon the market, and the moderate shipments of woollen goods now being made to the United States, render it uncertain whether prices will recover themselves this year.

4, Argyle Square, St. Pancras.

XXIX.—*Report on the Exhibition of Live Stock at Leicester.* By Edward Bowly, Senior Steward.

Since our pleasant meeting at the charming seaport, Plymouth, one most interesting feature in our Live Stock Exhibitions has been wanting, and it was indeed most cheering to find at Leicester the roan, the red, and the white shorthorn, with the white-faced Hereford, and the symmetrical Devon, in goodly array before us.

The mind almost shrinks from contemplating all that we have passed through during the three eventful years, 1865-1867; and we would gladly bury in oblivion the recollection of the dreadful rinderpest; how it pursued its fitful course through our country, sometimes carrying off whole herds in counties, then taking some and leaving others, paralysing every effort, and, as it were, mocking our endeavours to check its fatal course.

Many are the once happy families whom it has made desolate, some in comparative affluence have been reduced to poverty, the minds of not a few proprietors have given way under intense anxiety, and the loss to our country may be counted by millions.

Surely a subject involving such serious consequences ought never to have become the battle-field of party politics. Now that the Cattle Bill has been withdrawn, we trust that the Orders in Council will not be in the slightest degree relaxed, and that the usual good common-sense of Englishmen may prevail, and insure us a still more perfect bill next year. Our object is not for the protection of our home trade, as some interested parties have endeavoured to persuade the public, but to secure us from the fearful consequences of a renewed attack of this dire pestilence.

The show-yard was honoured with the presence of His Excellency Drouyn de Lhuys, who charmed us with his courtesy, delighted us with the great interest he took in all our arrangements, and expressed great admiration of many of the animals exhibited. His visit, we have reason to believe, was not undertaken in his private capacity, but with the view of gaining information for the establishment of a similar institution in

France—a good omen for the future, as nothing is so likely to secure to us the blessings of peace, as nations uniting together to promote agricultural improvement.

Horses.

This year for the first time horses head the catalogue of live stock with 167 entries, which with few exceptions were present; but, considering the valuable prizes in some classes offered, and that our tents were pitched in the classic hunting fields of England, the number was not equal to our anticipations.

Of the agricultural horses, which appeared first on the list, Messrs. Turnbull, Crosse, and Steadman were Judges. In Class 1, containing eight agricultural stallions, and Class 2, containing ten, some difficulty was experienced by the judges in awarding the prizes, owing to the mixture of the acknowledged breeds, Lincoln and Clydesdale, with others supposed to possess qualities adapted for their different localities. The first-prize animals in both classes were extremely active, symmetrical, and of great substance.

Of Suffolk stallions there were only five in Class 3, and four in Class 4, but they were all first-class animals, and well deserved the prizes awarded to them. The Suffolk mares, foals and fillies, were equally good. Mr. Tennant's first-prize mare in Class 16 possessed remarkable symmetry and substance; but her foal was not equal to that of Mr. Attwater's second prize in the same class. The Suffolks however, fully upheld the great name this breed has acquired; and it may be mentioned that one of the judges who officiated at Plymouth was struck with the great improvement in their feet and legs which has taken place during the last three years.

The Judges of Thoroughbred Horses, Hunters, Hackneys, and Ponies were Sir George Wombwell, Bart., and Messrs. Atkinson and Nainby. They had a very hot and hard day's work, having more classes than the judges of the Agricultural Horses, as well as a larger number competing. The ground, although on a beautiful site, was hard and slippery, and prevented so good a trial as was desirable. All hunters should be put into a gallop, but this was impossible. This year too it was fortunately decided to have no jumping, as unless the ground had been artificially prepared it would have been out of the question. We think, however, that under more favourable circumstances the public might be again gratified with a performance which at all times creates very great interest, and cannot fail to be financially advantageous to the Society.

The sending every selected horse to the veterinary yard occu-

pied much time: if by any other arrangement the necessity of this course could be avoided it would much facilitate the work of the judges. This we know is a difficult subject, but it is certainly open to future consideration.

The judges have very kindly sent us their Report. We are glad to find that they notice favourably the younger hunters. We thought them most promising, and if all are judiciously ridden during the next two years they will be a valuable lot. We considered the older hunters very useful; and it would be a man's own fault if he did not make a good fight on any of them. "Lady Derwent" was evidently the prize-taker, and she is a lady all over, and fit to carry a lady: how she would do a "big one" after twenty or thirty acres of steam-plough we, of course, had no opportunity of testing. "Mountain Dew," we thought, looked like business, and we should be well satisfied with a mount on him; but the horse of all others for a quick five-and-thirty minutes was Mr. Tailby's "Orangeman." He looked like keeping close at "their sterns" in any country. If a horse can stay that time without a check it is all that is required, as no fox can live longer before hounds of the present day, and the greater number will be pulled down in half the time. "Orangeman" was unfortunately disqualified from having been dressed for a splint.

In the Hunting Mare Class Captain Barlow's old "Silverlock," first at Bury, was eclipsed. She is of a right good old-fashioned sort, and such an one as we should have felt very comfortable on before she entered her teens. We sincerely wish Captain Barlow every success in perpetuating her blood.

We were much taken with Mr. Cook's "British Queen," the first prize in the Hackney Mare Class, and should prefer cantering such an animal to covert to availing ourselves of any of the modern appliances of rail or wheels of any kind. We had considerable difficulty in getting the horses paraded in proper succession from the men not being in their places. We would, therefore, suggest the erection of a clock in a conspicuous part of the show-yard, and that a small fine should be imposed on all grooms who are not with their horses at the time appointed for their being brought into the ring.

We now come to the Judge's Report, which we subjoin as follows:—

Report of the Judges of Thoroughbred Horses, Hunters, Hackneys, and Ponies.

Class 5. Thoroughbred Hunter Stallion.—Considering the very liberal prize offered by the Society for the best stallion in this class, we considered the entry a very moderate one, and "Angelus" and "Naseby" decidedly the two best.

Class 6. Hackney Stallion, not less than 14 hands 2 inches, nor exceeding 15 hands 2 inches.—Some very good animals were shown in this class. The first prize stallion, "Ambitiou," being a remarkably fine goer.

Class 7.—No entry in this class.

Class 8. Pony Stallion, under 14 hands 2 inches.—The entry in this class was very moderate in quality.

Class 9. Hunter, Mare or Gelding, not less than 5 years old.—In this Class, considering the liberal prize offered, we thought that although the entry was large, beyond the prize-takers there was little of superior merit. We expected to see in this class a better show of strong, well-bred, weight-carrying horses.

Class 10. Hunter, Mare or Gelding, 4 years-old.—This was an excellent class, and some very good animals were shown. We considered Mr. John Booth's 4 years-old (which has since taken the first prize for the best 4 years-old at Grantham, Louth, Driffield, and at the Yorkshire Show at Wetherby) the best. We consider this class to be the best class we had before us.

Class 11. Hunter, Mare in Foal, or with Foal at foot.—We considered this a very bad class.

Class 12. Not less than 14 hands 1 inch, nor exceeding 15 hands.—Entries were few in number, none requiring special remark.

Class 13. Hackney Mare or Gelding, not exceeding 15 hands 1 inch.—There was a fair good show of animals entered in this class.

Class 14. Cob, Mare or Gelding, not exceeding 14 hands 1 inch.—This class, in our opinion, does not call for any particular mention.

Class 15. Pony, Mare, not exceeding 14 hands.—This was a very good class, and some very clever ponies were shown.

In conclusion, we beg to state to the Society that we were much disappointed at the show of horses, hunters especially, considering the very liberal prizes offered by the Society, and the celebrity for fox-hunting of the county in which the Society held their meeting. Taking into consideration the great demand there must be for horses in a county like Leicester, we fully expected to see a very superior class of horses to those that were shown at the Royal Agricultural Society's Meeting this year.

(Signed) George O. Wombwell.
Joseph Atkinson.
C. M. Nainby.

Shorthorns.

Messrs. Drewry, Tallant, and Hunt were the Judges of Shorthorns, and report:—

Class XX., Bulls over Three Years old.—In this class, containing twenty entries, there were very many good animals. We awarded the first prize to No. 182, Mr. Booth's "Commander-in-Chief," a very large fine animal of excellent quality and flesh, and which may be said to have only two faults, viz., he has a little coarseness about his head, and is rather high at his tail head. The second prize went to No. 176, Mr. Peel's "Knight of Knowlsmere," a large, good animal, whose chief defect consisted in his head being rather coarse. The third prize was awarded to No. 173, Mr. Caless's "Huntsman," a very stylish looking animal, but rather deficient in his loins. The reserve number was 174, Mr. Barclay's "Heir of Englishman," a very good evenly made bull.

Class XXI., Bulls above Two and under Three Years old.—This class was not strong either in number or quality. The first prize was awarded to No. 196, Mr. Adcock's "Baron Geneva," which we considered much the best.

Class XXII., Bulls above One and under Two Years old.—In this class, altogether a very good one, there were twenty-two entries, and many very superior animals. The first prize Bull, No. 201, Mr. Meadows's

"Bolivar," was an animal perfect in form, with a wonderful coat; the only fault to be found with him being the faded colour of his hair. The second prize, No. 205, Lady Pigot's "Rosalie," was a stylish animal of first-rate quality, and showed good breeding. No. 214, the third prize, Mr. Walker's "Cotswold Examiner," and 208, the Reserve Number, Mr. Fawkes's "Fra Diavolo," were also very good bulls; and the same may be said of 212, Mr. Aylmer's "Prince Hopewell," No. 207, Mr. Fawkes's "Lord Belmore," No. 210, Mr. Peel's "Baron Beust," and No. 223, Lord Feversham's "Manchester."

Class XXIII., Bull Calves over Six and under Twelve Months old.—In this class were many very good calves, No. 226, Mr. Foljambe's "Knight of the Bath," being a wonderful animal of his age; the second prize, No. 227 "Knight of the Crescent," also belonging to Mr. Foljambe, was also very good, and had he been as faultless in his hind quarters as he was in his fore, would have taken first place. The Reserve Number, Mr. Fawkes's "Lord Montgomery;" No. 229, Mr. Lynn's "Grand Sultan," and No. 228, Lord Walsingham's "Wensleydale," were all very good calves.

Class XXIV., Cows above Three Years Old.—Was a very good class, but No. 253, Mr. Booth's "Lady Fragrant," was by far the best animal. The second prize, No. 250, Mr. How's "Jolly Queen," was a very evenly made cow, but rather tucked up, as if off her feed. The third prize, Lady Pigot's "Queen of Rosalea," was also good. The Reserve Number, 251, Mr. Tennant's "Miss Farewell," was a very fine cow, but rather deficient in her quarters; she would have been placed higher had it not been for this fault. No. 252, Mr. George Garne's "Lady Lucy," was highly commended; No. 243, Mr. Foljambe's "Cherry Blossom," No. 248, Sir W. De Capell Brooke's "Rose of Raby," and No. 255, Mr. Bradshaw's "Beauty," were all very good animals.

Class XXV., Heifers in Calf or Milk under Three Years Old.—With the exception of Her Majesty the Queen's "Alexandra," which was a good animal, this was a weak class.

Class XXVI., Yearling Heifers.—This was a very large class, but after half-a-dozen had been picked out, the remainder were not so good as we have seen at previous shows. The first prize was awarded to No. 276, Mr. How's "Lady Anne," a very perfect animal; the second prize to No. 282, Mr. Booth's "Patricia;" the third prize to No. 279, Mr. George Garne's "Duchess of Towneley;" and the Reserve Number, No. 283, Mr. Booth's "Lady Gaiety." These were all good animals, and we had some difficulty in placing them. Mr. Tennant's "Rose of York," No. 280, was also very good.

Class XXVII., Heifer Calves.—Was a very good class, the first prize, Lord Penrhyn's "Waterloo 27th" being a very fine calf, with excellent quality; while the second prize, No. 300, Mr. Stratton's "Ariel," is a very well made calf, with a capital coat; the Reserve Number, No. 292, Mr. Foljambe's "Flora;" No. 298, Lord Penrhyn's "Waterloo 26th," and No. 295, the Rev. W. H. Beever's "Lady Culshaw," are also very good.

We consider the above a very just report, and it is pleasant to find old acquaintances maintaining their previous high position. Mr. Booth's "Commander-in-Chief" first entered public life at Plymouth, where in moderate condition he obtained the second prize as a yearling; since Leicester he has obtained honours wherever he has appeared. Although in some former years there may have been a superior individual specimen, there has seldom been a better class of bulls over three years old.

Mr. Meadow's splendid yearling bull "Bolivar" sustained the

honours he obtained at Dublin in April, when he took the first prize in his class, and the Townley or 'Irish Farmer's Gazette' Plate, value 155*l.*, as the best of all the prize animals then present. "Bolivar" does not recross the Channel, having obtained a new home in Lancashire with Mr. Brierly, of Rhode House, near Manchester, where we have no doubt he will do good service, and prove a cheap purchase at 300 guineas.

The yearling bulls, with scarcely more than two exceptions, were a good lot; and we were much taken with Mr. Fawkes's pair as being animals of great promise, possessing size with first-rate quality of flesh and beautiful coats. Mr. Blythe may be congratulated on securing the "Reserve Number" for 120 guineas.

The cows were a grand class, probably the best we have ever had. Here again Mr. Booth's "Lady Fragrant" supports her early promise at Plymouth, where she obtained first prize as a yearling. We doubt if a better animal was ever exhibited under that distinguished name.

The judges very properly describe the two year-old heifer class as a weak one; and though very severe criticisms were made on their decisions in this class, the public should consider that shorthorn judges look to character as much as, or perhaps more than, they do to points in an animal. It may be remembered that when Mr. Bates went to see "Belvedere," his owner (Mr. Stephenson) was at the time from home, and the bull locked up in his house. Mr. Bates, however, having, through a crack in the door, obtained a good view of the animal's head, decided to purchase him, and his decision proved to be right.

Although the first prize yearling heifer was quite first-rate, and there were several other good animals, we think we have seen a better class on the whole.

That the younger females were not equal to the older ones is no cause for discouragement, since we know that very many breeders of first-class shorthorns will not incur the risk of training their animals for the show-yard, because by such training many valuable animals have been sacrificed, and the usefulness of a still larger number has been curtailed.

The late lamented Lord Ducie laboured for years, but without success, to secure the exhibition of animals in a more natural state than that in which they are usually shown; so that we can only say that it is a matter which must be allowed to take its course, though time may perhaps work a cure.

Before taking leave of the shorthorns, we must say a word on our friend Mr. Dent's closing remarks on the cattle classes at Plymouth, as, although unintentional on his part, they are calculated to mislead the uninitiated.

Pure shorthorns always have been, and with common care

always will be, a great milking tribe. We admit that their reputation has sometimes suffered, owing to young animals being too much forced, and the milk vessels becoming so coated with fatty matter that the usual development is impeded; if, however, the offspring of such animals are reared under more favourable circumstances, they generally prove good milkers.

In ordinary herds indifferent milkers are never allowed to have a second calf, while highly-bred shorthorns are too valuable to be put aside on such a plea. This has also operated unjustly against them as milkers; but we are glad to report that three highly-bred shorthorn cows, in ordinary condition, obtained the first prize last month at Gloucester, as those best adapted for dairy purposes, in competition with ten other lots.

Herefords.

The Herefords numbered thirty-two animals only in all classes. In Class 30 only three competed for the three prizes; in Class 31 only one bull-calf appeared; in Class 33, heifer in calf or milk, there were only a sufficient number for the prizes given, and the same may be said of Class 35, heifer calves.

Messrs. Franklin, Keary, and Anstey were the Judges of Hereford, Devon, and Sussex cattle.

They report that in Class 28, bulls over three years old, there were several good animals, but not of surpassing merit. Mr. Rogers takes the first prize in this class; Mr. Williams the second; and Mr. Paramore the third; while Her Majesty the Queen gets the Reserve Number.

They consider Mr. Arkwright's bull, which took the first prize in Class 29, a good animal; also Mr. Tudge's first prize bull in Class 30. Her Majesty the Queen takes the second prize in this class.

Mr. Arkwright takes the first prize in Class 32 of cows, which the judges say "contains some good animals," but "nothing first-rate." They consider Mr. Plumley's first prize two-year-old heifer in Class 33 "a really good animal."

Class 34, yearling heifers, was extremely good, and contained several excellent animals. Mr. Arkwright takes the first prize in this class; Her Majesty the Queen the second; and Mr. Tudge the third; and Mr. Arkwright gets the Reserve Number.

Devons.

The judges report that the show of Devons must be considered good, and perhaps beyond the average.

Class 36, bulls over three years' old, was large, and had several superior specimens. Mr. Geo. Turner takes the first prize, Viscount Falmouth second, Mr. Davy the third, and

Mr. Bodley the Reserve Number; while Messrs. Farthing and Buller are commended.

In Class 37, bulls above two and under three years old, Mr. Farthing's was the only entry; the judges, however, considered his bull worthy of the first prize.

Class 38, yearling bulls, was well filled, and contained several animals of great merit. Mr. Jno. A. Smith takes the first prize, Mr. Walter Farthing second, and Mr. J. H. Buller third; Mr. William Smith gets the Reserve Number; and Mr. Umbers is commended.

Class 39, bull calves. Although small, this was a pretty good class. Mr. Walter Farthing takes the first prize, Mr. George Turner the second, and Mr. Jno. A. Smith the Reserve Number.

Class 40, cows. This was a large class, and filled with many meritorious animals, Mr. Jno. A. Smith taking the first prize, Mr. William Smith the second, and Mr. Walter Farthing the third, while the Reserve Number falls to the lot of Her Majesty the Queen, and Mr. John A. Smith obtains a high commendation.

Class 41, heifers in-calf. The foregoing remarks on cows will apply equally to this class: they were a good lot. Mr. T. H. Buller takes the first prize, Mr. C. Hambro the second, and Mr. Walter Farthing the third; Mr. Geo. Turner the Reserve Number; Her Majesty the Queen is highly commended, and Mr. Geo. Turner is commended.

Class 42, yearling heifers, was a small class, not meriting any great commendation. Mr. William Smith takes the first prize, Mr. Jno. A. Smith the second, Mr. Walter Farthing the third, and Mr. Hambro the Reserve Number.

Class 43, heifer calves. Several nice growing animals were exhibited in this class, in which Her Majesty the Queen stands first, Mr. Jno. A. Smith second, Mr. T. H. Buller gets the Reserve Number, and is also highly commended, and Mr. Geo. Turner is commended.

Sussex Cattle.

Only five animals represented this breed in three classes, a number insufficient for the award of prizes, and on these the judges remark "there was no animal of superior merit."

Channel Islands.

The same judges officiated in these classes as in those of "other established breeds," and we have great pleasure in giving their reports:—

In reference to the Channel Islands cattle, the Judges consider the breed well represented in the three classes. In Class XLVII. the first prize is carried off by a bull of superior merit, which, indeed, for neatness of form, combined with size, can rarely be excelled. Although in this class only five animals are entered for competition, the Judges specially recommend that the second prize be given to No. 399, inasmuch as the animal is highly deserving.

In Class XLVIII. fifteen Cows are exhibited. In this class there are some very excellent specimens, which show unmistakable signs of superior quality. Besides those to which prizes have been adjudged, the Judges favourably notice in particular No. 412 and No. 402, cows of the Guernsey breed; these the Judges have highly commended.

In Class XLIX. there is not the same degree of competition as in the latter class, although it would appear the entries have been more numerous. In this class the first prize is taken by a small heifer, which owes her superiority particularly to the fine development of her udder, and to her general appearance as an excellent milker.

C. P. Le Cornu, }
Jno. Ellis, } Judges.

Leicester, July 16th, 1868.

Other Established Breeds.

Classes 50, 51, and 52.

In the classes comprising "Other Established Breeds" there was neither the number of entries nor the variety of cattle that might have been anticipated. Most prominent and in greatest number were the longhorns, or Dishley breed, so much improved and appreciated some century ago by Bakewell, Princeps, and other eminent breeders of that day in Leicestershire, Staffordshire, Lancashire, and other counties; of these there were many excellent specimens, the first prize bull being a splendid animal, and as near as could be perfect of his order. When the many good points of this description of cattle are considered, their great length, substance, and consequent weight, combined with a heavy flesh of excellent quality, and what is of great importance, their ascertained adaptation to the soil of this and adjoining counties, we see much reason why they should not be allowed to deteriorate, but would suggest that notwithstanding the supposed superiority of the improved shorthorns, they might in this part of England be more extensively bred, and grazed to advantage.

In the Cow Class, LI., were some excellent animals of the longhorns, many of them being, to all appearance, good milkers, and at the same time calculated to feed to a great weight when required.

The Heifer class offers little to remark on, and must be regarded somewhat as a weak one numerically and otherwise; there being but few entries, while a useful Yearling Longhorn Heifer, and one or two neat polled Norfolks, to which prizes were adjudged, were alone worthy of notice.

We cannot close this brief Report without a word in commendation of two exquisite Brittany Cows shown in Class LI., one of which especially appeared to us perfect of her kind.

Jno. Ellis, }
Chas. P. Le Cornu, } Judges.

Leicester, July 16th, 1868.

Sheep.

Leicesters.—The fine old breed of Leicesters, which have reigned predominant in the county since the days of Bakewell, were well represented.

The judges, Messrs. Twitchell, Leighton, and Mann, report "Class 53, Shearling Rams, of fair number and quality; Class 54, the Older Rams, not quite equal to former years; Class 55, Shearling Ewes, were large in number and of superior quality; Class 56, breeding ewes, not generally good." Lieut.-Col. Inge,

Mr. Sanday, Mr. Borton, Mr. Geo. Turner, Jun., and Mr. Wm. Brown were the prize takers, and Lord Berners and Mr. Riley were highly commended.

Cotswolds.

Although few of the old breeders on the Cotswolds exhibited, the classes were well filled. The Judges, Messrs. Clarke, Lord, and Bartholomew, report:—

That Class LVII., Shearling Rams, is not equal to former years, while Class LVIII., older Rams, is very superior. They also consider Class LIX., Shearling Ewes, generally good, and equal, if not superior, to those sheep heretofore exhibited at Royal shows.

Lincolns and other Long Wools.

The same judges officiated in these classes, and report:—

In Class LX., Shearling Rams, we found nineteen in number, and some few of them tolerably good, but some cross-bred amongst them, which we think should be shown in a class to themselves. We consider the class in general only moderate in quality.

Class LXI., Rams of any age.—We found in this class some very good specimens of Lincolns, and altogether a good class of breed.

Class LXII., Shearling Ewes, was a very good lot generally, and highly creditable to the breeders.

Oxfordshire Downs.

Messrs. Turner, Little, and Newton adjudicated the prizes in the Oxfordshire Downs, Hampshires, and Southdowns, and we have great pleasure in giving their excellent report:—

The class of Oxfordshire Shearling Rams was tolerably represented as to numbers, there being twenty-one entries. There was nothing particularly striking in any of the animals exhibited. Mr. Wallis's sheep were not quite so symmetrical as those he has shown on former occasions; he was, however, successful in carrying off the first and second prizes, and Mr. Roberts, a new exhibitor, the third prize. Mr. Bryant's shearlings did not come up to their former standard. Mr. Treadwell's sheep are well formed, heavy animals, but their coats too much resemble the Cotswold for sheep bearing the name of Downs, hence most probably the disqualification of his two pens of shearling ewes by the inspectors of shearing; had they not been set aside, the award of the Judges would have been materially altered in the ewe class. There was not much competition in the old sheep class; not sufficient, indeed, to enable the Judges to award the third prize; Mr. Wallis is first, and Mr. Treadwell second, with two useful well formed sheep, Mr. Wallis's sheep in this class being of good quality and character. In the Shearling Ewe class there was not much competition, Mr. Treadwell's two pens being disqualified. Mr. Wallis won the first prize easily; the second prize was awarded to Mr. Overman's pen. The contrast in the coats of these and Mr. Treadwell's was so great that it was difficult to reconcile their belonging to the same class of sheep.

Hampshire Downs.

The show of Hampshire Downs was very limited, there being only sixteen entries altogether, viz., 9 shearling rams, 4 older rams, and three pens of shearling ewes.

The first prize in the Shearling Ram class was awarded to a large sheep of very good quality (but not quite the right stamp about the head for the improved Hampshire), belonging to Messrs. Russell, Dartford, Kent; Mr. King's second prize being more in the form of the improved Hampshire, though not so large, was of good quality and very compact. Mr. Coles's third prize was still smaller. Mr. J. Rawlence's shearlings were not quite in the form in which he usually exhibits them; one of his was selected for the reserve number; but he makes up for his short comings in this class by taking first and second prizes both for old rams and shearling ewes with animals of great size, and of fine symmetry and quality, and which fully sustain the reputation of the Rawlence flock. There were not sufficient entries in either class to enable the Judges to award the third prize, but they recommended a special prize to Mr. R. Coles's old sheep. All Mr. Rawlence's sheep deserved the honours they gained, although so few were exhibited in the classes.

N.B.—The Judges venture to call the attention of the Council to the state of the coats of some of the sheep exhibited in this class. The coats were so thoroughly saturated with oil or grease, that it prevented the proper examination of the animals; the hands of the Judges being made disgustingly filthy, and their clothes spoiled, without any corresponding good to the sheep. They venture to hope some steps may be taken to prevent the nuisance in future.

Southdowns.

The aristocratic Southdowns were as well represented as usual, there being 56 entries, viz., 28 Shearling Rams, 19 Rams of any age, and 9 pens of Shearling Ewes. In the Shearling Rams, Mr. Ryder exhibited two very superior sheep, one of which wrested the laurels from the Merton flock for the first time for some years; and Mr. Ryder also took first prize for the aged Rams, with as perfect a specimen of a Southdown Ram as has been exhibited at the Royal or any other show for many years, the ram's only fault being that he was docked too short, or rather that his tail was too small, but this was not of much importance when every other point was marked "excellent." Lord Walsingham's sheep, although full of quality, were not so good and matching in form as on many former occasions. His Lordship was awarded second and third prizes in the Shearling class, and second in the older Ram class, Sir W. Throckmorton taking third in the latter class. His Grace the Duke of Richmond sent five very neat well-made sheep. There were some very good specimens of Shearlings from Lord Radnor's and Lord Soudes's flock.

The class of Shearling Ewes did not produce anything remarkable on this occasion, but there was very good competition, none of the entries being very inferior. Lord Walsingham took first prize with a very good pen, but they were not quite so even as usual. To Lord Radnor was awarded the second prize, and the Duke of Richmond took the third. Sir W. Throckmorton's pen was "highly commended;" but for their lightness of wool and tendency to nakedness about the head and ears, they would probably have displaced his Grace for the third prize.

Shropshires.

Again we have a report from the judges upon which we cannot improve, and have great pleasure in transcribing it. Pursuing this course, we place the Hampshires a little out of their order in the catalogue:—

This is one of the largest and most important classes in the show, numbering 69 entries; amongst them are many good serviceable sheep, and taken as a class generally, the character shows that although Shropshire

breeders have not arrived at that uniformity which is so desirable, yet that is becoming one of the leading points with the large majority of the exhibitors; but we found a few animals wanting in the special type and character of the breed.

Class LXX.—This is also a numerous class, and a very superior one, containing 23 entries, which are a great credit to the exhibitors, and show the care and attention which has been bestowed in the breeding. We pronounce them not only one of the most numerous, but one of the best exhibitions of aged rams.

Class LXXI.—This class, including 17 entries, is an exceedingly good one; and although we had not much difficulty in arriving at our decisions, yet we felt we were leaving a lot of good animals worthy of all the notice that the Judges could give them, and, taken as a whole, the class does great credit to the breeders.

In making our selections we have endeavoured to pick out a class of animals that, while carrying good size with early maturity, a good weight of wool of fine quality, and being capable of exposure in this varied climate, are also likely to reproduce in their species uniformity of type and character, which is a very desirable point in this as in all other established breeds of sheep.

We regret to find the difficulty that has again occurred respecting shearing, and we would urge upon exhibitors to lend all assistance they can to the Council of the Royal Agricultural Society of England in arriving at some satisfactory solution of this matter, which has a tendency to weaken the exhibition of classes wherein it occurs.

THOS. HORLEY, JUN.,
JNO. WOODS.

PIGS.

Messrs. Edmonds, Druce, and Slater were the Judges of pigs, and report them to be "on an average of former years in number and merit, and nothing to call forth special remark."

The boars in the Berkshire class were not equal to those of some former years. Sir William Throckmorton's first prize sow in Class 83 is a fine specimen of the breed, but not being able to get her on her legs, we could not see her to advantage. The ten sows in this class were superior to the boars. The young sows were a still better lot. The three, belonging to Mr. Smith of Henley-in-Arden, which obtained the first prize in Class 88, are first-rate animals.

There were many fine specimens in the large and small white breeds, as well as those not competing in the above classes. Many animals, however, were sadly too fat for breeding purposes. It appeared rather *infra dig.* to see breeding sows reclining, and opening their mouths like young birds in a nest to receive food from their attendants. If they, like parent birds, had to seek for worms in the present drought instead of moulding balls from the meal bags, their pets might be more prolific.

GENERAL REMARKS.

The show of live stock at Leicester must be pronounced a great success. It is difficult to trace improvement year by year; we can only form an estimate by looking back over a more

lengthened period. Whilst we have at present no individual specimens of animals superior to those exhibited by Mr. Bates and others at Oxford in 1839, the number of good animals has certainly immensely increased throughout the United Kingdom. In those days it was the exception to find a pure-bred bull in the farmer's hands; now no intelligent man is without one. It should ever be remembered that in breeding we can only assist nature, and that our efforts are confined within narrow limits; so that the great object of exhibitions being to increase the numbers of superior stock of all kinds throughout the kingdom—when this has been done, as it certainly has been—much has been achieved.

To report progress, we must for one moment refer to our implement department. In 1839, drill husbandry was by no means general; mowers, reapers, and steam thrashing machines were unknown in practice; and steam ploughing was considered an Utopian idea. Our present state as regards this department is evidence that the progress during the last 30 years has exceeded that of the two previous centuries.

The Royal Agricultural Society has contributed in no small degree to this extraordinary development. The council may have made mistakes, and may not on all occasions have done everything that was possible; but we cannot believe that the severe remarks on its actions made at the last General Meeting will be endorsed by the members generally; remarks which, it is to be hoped, were made in good faith, although under much misapprehension.

The Society has never yet met with the encouragement it deserves; instead of having only 5000 members, we ought to have 10,000. The names of many owners of broad acres are still absent from our subscription list, and as every Englishman is deeply interested in increasing the produce of our soil, there is an extensive area over which we are justified in looking for support.

Now that we have a Royal Prince as our President, and are going to visit the most important mercantile district in the world, let us hope new light will burst forth upon us, and that the Royal Agricultural Society of England will occupy a higher position than it has ever yet done, and be entirely worthy of the fine old country which it is our pride and happiness to call our home.

We are glad to report the continued success of our Sunday service in the show-yard. We had an attentive congregation of upwards of 500 herdsmen and grooms. The clergyman of the parish, taking for his text the 23rd Psalm, preached a very impressive and appropriate sermon, which was listened to with great interest. We think the attendance of stewards and other officials on the occasion has an influence for good.

We shall ever retain the most pleasing reminiscence of our days of stewardship, and the many happy hours spent at Plymouth, Bury, and Leicester. To our friend Mr. Gibbs we feel peculiarly indebted: his unvarying amiability and ever ready help in times of difficulty made the office a pleasure rather than a toil. To his untiring energy and methodical arrangement we must attribute the success which has for so many years attended our exhibitions.

Siddington House, August 22nd, 1868.

XXX.—*General Report on the Exhibition of Implements at the Leicester Meeting.* By WILLIAM SANDAY, Senior Steward.

THE present paper will be one of very modest pretensions. It is at no time an easy matter to write anything very readable upon a trial of Implements. There is little variety or novelty in one Show as compared with another, and the only substantial ground is cut from under one's feet by the detailed Report of the Judges which is appended. To this I must refer all who take a practical interest in the subject. At the same time there may be perhaps some few remarks upon the general characteristics of the Show, which, though sufficiently obvious in themselves, it may yet be worth while to put upon record in a brief and summary form.

Lord Cathcart, who was Senior Steward last year, speaks of the exhibition of implements at Bury "as perhaps the best ever known." These words were doubtless true at the time, but they have ceased to be true now. There can be no doubt whatever that in the implement department at least, Bury was surpassed by Leicester. Both in magnitude and in excellence the Show this year is without a parallel in the history of the Society.

The improvement in the quality of the implements exhibited was as marked as the increase in their number, and yet it would be difficult to pick out any one point in which the advance has been made. It has been for the most part an advance in construction generally, and has not depended upon any one new and striking invention. In this respect it would seem that we have gone almost as far as it is possible to go, though on the other hand there is no saying where the progress of science will tend. Some fresh surprise is often ready for us just when it is least expected.

In the ploughs, however, there is one distinct novelty; though even here the novelty is not so much in the idea itself as in the application of it. Since our last trial, or perhaps I should say within the last five years, ploughs have been fitted with patent

axles. This is a very great and obvious improvement, rendering it much easier to make alterations in the settling, while at the same time the friction of the wheels and axles is greatly reduced. The value of the improvements in ploughs generally was well tested. Twenty years ago no one would ever have thought of trying to drive a plough through land such as that which was experimented upon at Leicester.

The harrows now used in steam-cultivation appeared to work admirably. But the real centre of interest was the trial of steam-cultivators themselves, though, strange to say, the attendance of the public was meagre in the extreme. It would seem as if the novelty of the thing had worn off, and steam-cultivation was beginning to be regarded as an established fact. This, at least, is the only way in which the apparent apathy of the public can be accounted for. Certainly the trials were not at fault, for never since the Society was formed have they been so interesting or so thorough. The conditions under which they were carried on were exceedingly severe. The land was as hard as iron. It seemed about as "arable" as solid rock. And yet it can hardly be regretted that it was so. The test applied to the steam-cultivators was this year at least a crucial test, and it only served to bring out all the more triumphantly their extraordinary powers.

At one time, indeed, there was a doubt as to whether, considering the excessive hardness of the soil, and other difficulties that had arisen, it would not be well to defer the trials until the autumn. But the judges felt that they could make their awards; the exhibitors were consulted, and expressed their willingness to submit to the trials without delay; and a special meeting of the Council concurred in the opinion, to which the stewards cordially assented, that the trials should be held then and there. I venture to think that this decision was right, and that the result of the trials could not have been different nor more satisfactory. The one prominent moral of the show may be said to be this,—that in a few years every operation of field tillage will be performed by steam. How this will be done is another question, but the general direction that will be taken it is not very hard to predict. The machinery is so expensive, that it will not be worth the while of individual farmers to provide themselves with it. It will be best taken up as a distinct speculation, and sets let out for hire. The plan has been tried with considerable success in the district from which I am writing, the charge for hire being 1*l.* per acre twice cultivated. It might be thought that as a consequence of the increased use of machinery, fewer hands would have to be employed; but the probability is that, as has previously been the case, fewer hands will not be employed, but the land will be

more thoroughly worked; or at least a man will be able to choose between these two alternatives.

The changes which have been made in the organisation of the implement department worked extremely well. The work was better apportioned, and the addition to the number of the judges was a manifest advantage. There was, however, a slight mistake in the miscellaneous department, which in future years may be easily avoided.

I cannot allow this opportunity to pass without adding my testimony to the indefatigable way in which the judges each day carried on their work. The circumstances were very arduous and trying. The heat was such as is seldom known in England, and the number of implements exhibited, as well as the closeness of the competition, such as has never been known at any of the Royal Society's shows.

Some of the judges, in order to get their work finished, were compelled to carry on their investigations by night as well as day, and their awards gave general and complete satisfaction. I am sure we owe them our best thanks.

For my own part, too, I should not like to close these remarks without expressing the deep obligations I am under to my fellow stewards for their very energetic, able, and efficient assistance all through the show. In retiring from a place in the administration of the implement department, I have the satisfaction to know that it is left in thoroughly competent hands.

Holme Pierrepont.

Report of the Judges on Horse Ploughs, &c.

The prizes offered by the Royal Agricultural Society in this department were as follows, viz.:—

	£.
For the Class of Wheel Ploughs	30
" " Swing Ploughs	20
" " Subsoil Ploughs	10
" " Paring Ploughs	10

After meeting the Stewards and receiving instructions, we resolved that, as had formerly, and very properly, been done, a subdivision of the Class of Wheel Ploughs should be arranged; and we decided that the Wheel Ploughs should be divided into three Classes, viz. General Purpose Ploughs, Light Land Ploughs, and Deep Land Ploughs. We next visited the various Stands in the yard, and took down the numbers of the implements considered suitable for trial, and selected sixty-one implements variously constructed, some of which were soon on their way to the field for competition. Of three fields shown by the Stewards we selected two, which we considered most suitable for the effectually carrying out, as far as possible, a perfect test of the implements.

Class I.—*General Purpose Ploughs.*

Wheel Ploughs.—Twelve were selected and chosen for trial in this Class; each having allotted to it about the third part of an acre of land.

The conditions with reference to this important class of implements were that each plough should in three bouts get to a depth of six inches; four bouts at six inches; four, at seven and a half; and the remainder at nine inches.

The land on which this trial took place was pretty even, and having been some time ago loosened and broken, the work was much better executed than could at first sight be expected; but after careful inspection during its progress it was quite evident that several plots were much better done than others, in the cuttings of furrows and levelness of bottom, and we therefore selected six for a second trial. The soil in this case was much tougher and more retentive than in the former instance; the work being done at one uniform depth of seven inches.

Messrs. Cooke and Co. (139), Hornsby (1070), Lewis (1119), Howard (2214), Ball and Son (1553), Ransome (4349), were the selected competitors. The quality of the work by the whole was so superior as to necessitate us to go to the severer test of clearing the bottom of the furrows, so as to show that part of their work as well as the surface. This test was rather considered by some of the exhibitors to be "unbecoming;" at all events it was unexpected. However, it so exposed that most essential part of the plough's work as to enable us to make a further selection for the "final trial," viz., Messrs. Hornsby, Ransome, and Howard; each to take four bouts at seven inches deep.

After laying bare the soil and using the scraper across the whole piece, we found the work altogether superior; but taking into consideration how they stood with each other in the two former trials, we at once placed them thus, awarding to—

	£.
Messrs. J. and F. Howard (No. 1214)	9
Messrs. Ransome and Sims (No. 4349)	5

We highly commended in this Class—
Messrs. Hornsby (No. 1070).

Class II.—*Light Land Ploughs.*

Wheel Ploughs.—In this Class nine implements were selected, and about a corresponding piece of ground allotted to each, viz., one-third part of an acre. The conditions under which these ploughs were arranged to work were to take three bouts to get into a depth of five inches; six bouts at five inches; and the remainder at six. The ploughing altogether was very well executed by each, yet still we were enabled to mark out a superiority in the work done by Messrs. Ransome, Howard, and Hornsby, whose implements were again selected for a second trial.

The ground in this case was adjoining and of similar character to that which the General Purpose Ploughs had for their final trial: the conditions, one uniform depth of six inches. All the competitors executed their work most admirably, but the application of the test exposing the cut at the bottom enabled us to make the following award:—

	£.
Messrs. J. and F. Howard (1211)	6
Messrs. Ransome and Sims (4346)	4

Highly commending Messrs. Hornsby (1068).

Class III.—*Deep Land Ploughs.*

Wheel Ploughs.—Five ploughs represented this Class, and a most formidable appearance they had with their teams of four horses each, evidently causing

great interest to the lookers-on. The conditions agreed upon as to the work required of them were—three bouts to get into a depth of ten inches; five bouts at ten inches; and the remainder at twelve. The soil from its appearance at the surface gave us the idea that it would be the most even and easy to work of any we had appointed, but we were immensely surprised to find, at the depth of ten inches (which never before had been stirred), a most retentive clay with beds of pebbly gravel turning up in huge masses, not even breaking in pieces by the action of the ploughs. As may be supposed, this was a most severe test for the horses as well as the implements; but we must make mention of the superior work done by a few of them, notwithstanding the obstructions. Messrs. Cooke, Hornsby, Ransome, and Howard were selected for a second trial; the conditions being a depth of *ten* inches, as we found that even at this depth the temperament and strength of the horses were greatly trespassed upon. The soil was similar to that in the first trials, though, if possible, of a more pebbly, cohesive character; exhibitors pronouncing it much more difficult ground. Messrs. Ransome's work was very superior to that of all others, turning the furrow, and leaving a better horse-walk than any of the rest. We therefore awarded—

	£.
Messrs. Ransome and Sims (4354)	6

Highly commending Messrs. Cooke and Co. (111).

Class IV.—*Swing-Ploughs.*

In dealing with these implements we could not for a moment entertain the idea of dividing them into three classes, from the almost utter impracticability of a man satisfactorily holding a swing-plough for deep purposes. Indeed, with only "General Purpose and Light-land Swing-Ploughs" we shall have no small difficulty in ascertaining the plough's merits; for the character of the work so much depends on the efficiency of the ploughman, regardless of the mechanical construction of the implement. We therefore have divided Swing-Ploughs into two classes only: General Purpose and Light-land Ploughs.

General Purpose Ploughs.

Swing-Ploughs.—Seven ploughs were presented for trial in this class, the ground being in the same field as, and of similar texture to, that ploughed in the first trial of General Purpose Wheel-Ploughs. The conditions arranged were, to get into depth of six inches in three bouts: four bouts at six inches; four at seven and a half; and the remainder nine. At the very first outset the stress put on the ploughman's abilities—causing one of the crack competitors to say, "I hope never again to see a swing-plough trial"—proved the accuracy of our idea that we cannot, with any degree of positiveness, arrive at a just conclusion as to the mechanical construction of the implement where so much depends on the ability of the ploughman. However, after much patience on our part, and incessant jerks up and down of the ploughs when at the depth of nine inches, the first trial was ended; and we must give the ploughmen great credit for their work, which on the whole, and especially under the circumstances, was well executed. However, as might be supposed, some had to be blackballed; and we selected five for a second trial, viz., Messrs. Cooke, Hornsby, Ball and Son, Howard, and Ransome, who were required to take four furrows each, at seven inches deep. This trial was soon completed, and we awarded the following prizes:—

	£
Messrs. J. and F. Howard (1217)	8
Messrs. Ransome and Sims (4351)	4

Commending Messrs. Cooke and Co. (112). Messrs. Hornsby and Sons (1073), Messrs. Ball and Son (1556).

Class V.—*Light-land Ploughs.*

Swing-Ploughs.—Six ploughs in this class were presented, and again the crack ploughmen were at their posts. Messrs. Ransome, Howard, Ball and Son, Cooke and Co, Hornsby, and Vickers, were the representatives. The conditions being read over—which were three bouts to get into a depth of five inches, six bouts at five inches, and the remainder at six—they started in the same field as in the case of the last trial, and about the third part of an acre was allotted to each. Evidently depth had great influence upon the ploughmen's exertions, as they appeared much more comfortable in the execution of this work than the former; but even here also showing how dependent was the success of the implement upon the ploughman's abilities in keeping the plough steady, maintaining a uniform depth, and cutting a level bottom. Three, viz., Messrs. Ransome, Hornsby, and Howard, were selected for a second trial, and to take four bouts at six inches deep. It may be supposed that with three such implements, each wielded by the crack ploughman and horses of the firm, the work would be *well* done: but it was beyond that,—it was EXCELLENT. However, after applying the test of laying bare the furrows we were enabled to decide and make the following awards, viz.:—

	£
Messrs. J. and F. Howard (1218)	5
Messrs. Ransome and Sims (4348)	3

Commending Messrs. Hornsby and Sons (1072).

Class VI.—*Subsoil-Ploughs.*

Ten subsoil-ploughs were entered for this class, and the conditions were to go one bout at six inches, and one bout at seven inches below the furrow taken out in the first instance at a depth of six inches, thereby removing the soil to a depth of thirteen inches. So much depended upon the horse-power applied that we were somewhat dubious as to the selection we ought to make for a second trial. However, we finally fixed upon Messrs. Howard, Ransome, Mellard, and the Reading Iron Company. The implements of these firms were taken to another field, where the dynamometrical trials were being executed by a steam-engine of Messrs. Fowler and Co. This gave us a decided advantage in selecting the best implement; for there was no jibbing, no kibble-tires breaking, but, on the contrary, one steady pull. If the implement could pierce the soil, it was compelled to do so; if defective in construction, the fact was proved at once. A similar depth of seven inches was taken again, below a 6-inch furrow. Two of the implements at once had to succumb to the pressure put upon them; the one broke, and the other would not enter the ground at the depth. We had, therefore, to select from the two which did superior work, and awarded as follows:—

	£
Messrs. J. F. Howard (1240)	6
Messrs. Ransome and Sims (4364)	4

Class VII.—*Paring-Ploughs.*

There were five entries in this class. As the state of the land was so unsuited for paring, owing to its brittle and baked surface, we could not expect to see work executed proportionally as well as that before witnessed with the other ploughs. However, under even all difficulties, some of the work was very fairly done, and we awarded—

	£
Messrs. Ransome and Sims (4358)	6
Messrs. J. and F. Howard (1214)	4

Highly commending Messrs. Ball and Son (1560).

Three Digging-Ploughs were shown at work: these most effectually smashed up the land at a depth of six inches, and we think them desirable implements, especially for autumn and spring cultivation. Although merely an additional differently-formed breast attached to the ordinary plough it completely pulverises the furrow in the action of turning. We highly commended the three exhibited, viz., Messrs. Ransome (4357), Howard (1214), and Hornsby (1070).

Two Double-furrow Ploughs were also put to work by Messrs. Howard and Ransome. Each had two horses attached, and the soil being extremely light (a vetch stubble) they both did their work beautifully and with perfect ease to the horses; in an ordinary texture of soil we believe the same work could be accomplished by three horses with similar ease, thereby saving one horse and one man. A like attempt was made with a double-furrow plough (2515) of very peculiar mechanism, invented by Mr. Pirrie of Scotland, and manufactured by Messrs. Fowler and Co., price 15*l.* Its work was very deficient in exactness to that of the two former; but the exhibitor having a single-plough (2516) on the same principle (price 7*l.*), he particularly begged to have it tested, and we therefore obliged him by placing it on similar conditions to those attaching to the General Purpose Plough. To furnish a correct test, we gave it two bouts in the dynamometrical trials; but we regret that in the case of this, a new inventor and exhibitor, we cannot speak more favourably of its work; the proof of draught by the dynamometer being much more than that of any of the other ploughs tested.

So near perfection has the plough become in the artistic models presented, that it was a matter of deep consideration with us as to the mode to be adopted for determining how far the *acme* of excellence was to be obtained. Ultimately, we directed that their furrows should be laid bare at the bottom, so as to expose that part as well as the surface. This was accomplished by a spade and a small piece of wood acting as a scraper crosswise of the furrows, giving us the best and only test of the evenness of the cut at the bottom. We fear the exhibitors may have considered us rather too severe in our test; but on account of their excellence alone were we driven to such an extreme investigation. However, we hope they will give us credit for having done our best in the emergency wherein by the excellence of their implements they placed us. All the final trials were thus conducted; and we must acknowledge that in many instances the work done was very superior, considering the difficult ground of clay and beds of pebbles that had to be encountered.

In conclusion, we beg to tender our best thanks to the Stewards who so kindly and efficiently attended to our needs. We confess that what with the oppressive heat of the weather, and the very near approach to equality of excellence in the implements exhibited, our duties were rather onerous; but we beg most thankfully to acknowledge that they were to a great extent relieved by the Stewards' assistance, and by the promptness of Mr. Johnson (Foreman of the Field), who was ever ready in the supply of horses, as well as in having the ploughmen promptly marshalled to order for other trials.

JOHN WHEATLEY.
THOMAS P. DODS.
GEORGE M. HIPWELL.

For the following table of results obtained on dynamometrical trials of ploughs—tested by the aid of a steam-engine—the Judges are indebted to Mr. Amos, to whom they desire to tender their best thanks. The Judges also gratefully acknowledge the valuable services rendered to them in this department by Mr. Cheeseman.

DYNAMOMETRICAL TRIALS AT THE LEICESTER MEETING, July, 1868.

NAME OF EXHIBITOR.	Catalogue Number.	Distance in Yards.	Time.	Dimensions of Furrow.	Cubic feet of Earth removed.	Horse-Power required to work Implement.	Units of Power Expended.	Units of Power required to move 1 Cubic foot.	Stress on Draught Hook.	Description of Implement.
Test Plough	1553	103	′ ″ 1·48	Inches. 9× 6	115·9	2·133	7,031·	606·5	227·5	Light Wheel Ploughs.
,, ...	1553	102	2·5	9× 6	114·75	2·125	70,157·38	611·4	229·27	
Ransomes and Sims	4346	98½	2·5	9× 6	110·8	1·55	54,145·45	461·6	173·08	
Hornsby and Sons ..	1068	102	1·55	9× 6	114·75	1·30	43,052·21	375·2	140·7	
J. F. Howard ..	1211	104	2·3	9× 6	117·	1·67	55,359·68	473·1	177·4	
Test Plough	1553	103	2·0	10× 7½	160·68	3·23	106,696·7	664·	345·3	General Purpose Wheel Ploughs.
J. F. Howard ..	1214	102	2·15	10× 7½	159·12	2·85	940,54·	591·09	307·36	
Ransomes and Sons	4349	101	2·31	10× 7½	157·56	3·23	106,696·7	677·1	352·1	
Hornsby and Sons ..	1070	102	2·8	10× 7½	159·12	2·78	91,851·1	577·2	300·1	
Fowler and Co. ..	2516	101	2·21	10× 7½	157·56	4·58	151,329·24	960·4	499·4	
Cooke and Co. ..	111	101	2·40	12×18	454·5	12·56	414,479·3	911·9	1367·9	Deep Land Ploughs with Wheels.
Hornsby and Sons ..	1071	101	2·51	11×16	370·33	12·87	424,679·65	1146·7	1401·5	
Ransomes and Sims	4354	100	2·45	12×18	450·	13·49	445·271·9	989·5	1484·2	

Report of Trials of Cultivators, Clod-crushers, Rollers, and Harrows.

CLASS IV.—*Cultivators.*

1*st Trial.*—These implements were tried on a piece of tare-stubble, from which the crop had been recently removed, and which was in a tolerably friable state on the surface, but exceedingly hard and tough below; so much so that only two out of the eighteen selected for trial were able to withstand the severity of the strain. We therefore came to the inevitable conclusion that the implement No. 405, exhibited by Mr. E. H. Bentall, which did its work most admirably, and the cultivator No. 49, exhibited by Mr. C. Clay—and those only—had any claim to a prize. At the same time we should be sorry to condemn all the other implements, as many of them would certainly be most useful and efficient on light soils.

2*nd Trial.*—Owing to the very exceptional state of the ground, we were requested by the Stewards to give this class a second trial, which took place on a piece of land which had been steam-cultivated, and afterwards used in the clod-crusher trials. Here also Bentall and Clay held their own against all comers; but several which broke down on the previous trial made good work, particularly Messrs. Hunt and Pickering's, No. 508, which we Highly Commend. The implements also of Messrs. G. Ball, Coleman and Morton, and Mellard and Co., proved useful for light soils.

On the whole, we consider that the cultivator that will do its work under the greatest difficulties, will also do so under other and more favourable circumstances, and therefore must be considered the *best*; we therefore award the First Prize, of 13*l.*, to E. H. Bentall (No. 405); the Second Prize, of 7*l.*, to Mr. Clay (No. 49); and highly commend No. 508, exhibited by Messrs. Hunt and Pickering.

CLASS V.—*Clodcrushers.*

Clodcrushers were put to work on the land which had been steam-cultivated by Howard's tackle, some portion having been also steam-harrowed. It was in a very rough state, and admirably suited to test the capabilities of a clodcrusher. Sixteen implements were selected for trial, being a very large increase on the number (8) tried at Newcastle. But it was apparent that a large majority of them were simply variations of the principles which distinguished the prize implements on that occasion, and although perhaps improved in some minor details of construction, they had no claim to take precedence of the original inventions. Our attention, therefore, was soon confined to the four implements noticed in our award, and which we tested a second time on land worked by the cultivators on their second trial, after which we came to the conclusion that the Beverley Iron and Waggon Company were still to the fore in this class, and we award them the First Prize, of 11*l.*, and the Second Prize, of 9*l.*, to Messrs. Amies and Barford for their Press-wheel Roller, fitted with scrapers; also fore-steerage wheel in lieu of shafts, which we consider a very great improvement in the case of such heavy rollers. We also highly commend W. Crosskill and Sons (No. 23), and commend E. Cambridge and Co. (No. 89).

CLASS VI.—*Rollers.*

Ten rollers were selected in this class, and were tried on the land used for the horse-plough trials, and subsequently for the trial of heavy harrows over the same ground. In this class we had little difficulty in arriving at a decision. Considering the Water-Ballasting Roller (No. 228) of Messrs. Amies and Barford

still superior to any other, we awarded them the First Prize, of 6*l.*, and the Second Prize, of 4*l.*, to the Beverley Iron and Waggon Company. We also Highly Commend Amies and Barford's Metal-Ballast Roller (No. 232), which has been improved since the Newcastle Meeting by division into 3 instead of 2 cylinders. We thus fully corroborate the Newcastle awards. We also commend Mr. W. Lewis's 13-Cylinder Roller (No. 1127), and Messrs. Holmes and Son's 1-Horse 3-cylinder Roller (No. 1042).

CLASS VII.—*Harrows.*

Twenty-six sets having been selected out of the very large number exhibited, we proceeded to test them on the ground which had been ploughed by horse-power. It was, however, in such an unfavourable state, that only the drag and other heavy harrows could work it; but this was not of much consequence, as most of the lighter harrows were merely modifications of the heavier implements.

Owing to there being only one class—and the small amount of 10*l.* only being available for prizes—for harrows of all descriptions, we had considerable difficulty in making our awards, and would suggest to the Council that in future, harrows should be divided into four classes, viz., Drag, General Purpose, Light Seed, and Chain.

Having well considered the merits of the different implements, we came to the conclusion that Messrs. Howard still maintain their position in this class, and are entitled to the First Prize, of 13*l.* The Second Prize, of 7*l.*, we award to Messrs. Ransomes and Sims; their Jointed Harrows being especially worthy of praise. We highly commend the Rotary Harrows (No. 3781) of Messrs. Ashby and Jeffrey, which work in a very efficient manner. We also highly commend the Drag Harrow (No. 1666) of Mr. T. Perkins, Hitchin, exhibited by Mr. W. F. Johnson, of Leicester, which faced the rough ground exceedingly well. Everett's "Twitch Extirpator" (No. 1041), exhibited by Holmes and Sons, we also highly commend, as a very useful and effective implement on light soils. The Adjustible Harrow on carriage (No. 5), invented and exhibited by H. Denton, Wolverhampton, also claims our notice. The harrow is carried to and fro, and worked either wholly or in part by means of a windlass, its entire manipulation being within the power of a boy, which is a manifest advantage over the ordinary chain-harrow; we therefore highly commend No. 5.

We also commend the original chain-harrow, No. 97, exhibited by E. Cambridge and Co.

In making our awards we have taken into consideration the price of each implement as catalogued, also strength and simplicity of construction, and such other points as in our opinion will be appreciated by the general purchaser.

The unprecedentedly hard state of the trial-grounds was, on the whole, not favourable to a perfectly satisfactory trial, but at the same time we do not think that the best implements have suffered by the severity of the test.

We regret that the Society's Rule No. 30 practically prevents a third prize being given. This, we think, operates in some instances to the prejudice of the exhibitor.

In conclusion, we beg to thank the Stewards for their unremitting attention during the performance of our duties.

SCHEDULE OF AWARDS.

	Exhibitors.	Catalogue No.	Amount of Prize.
CLASS IV. 18 Cultivators	E. H. Bentall	405	13*l.*
	C. Clay	49	7
	Hunt and Pickering	508	Highly Commended.
CLASS V. 16 Clodcrushers	Beverley Iron and Waggon Co.	907	11*l.*
	Amies and Barford	221	9
	W. Crosskill and Sons	23	Highly Commended.
	E. Cambridge and Co.	89	Commended.
CLASS VI. 10 Rollers ..	Amies and Barford	228	6*l.*
	Beverley Iron aud Waggon Co.	909	4
	Amies and Barford	232	Highly Commended.
	W. Lewis	1127	Commended.
	Holmes and Sons	1042	Commended.
CLASS VII. 25 Harrows ..	J. and F. Howard	1256	13*l.*
	Ransomes and Sims	4375	7
	Ashby and Jeffrey	3781	Highly Commended.
	W. F. Johnson	1666	Highly Commended.
	Holmes and Sons	1041	Highly Commended.
	Henry Denton	5	Highly Commended.
	E. Cambridge and Co.	97	Commended.

FRANCIS SHERBORN.
WILLIAM ROBERTS.
THOMAS CHAMBERS, Jun.

Report of the Judges for Brick and Tile Machines and Miscellaneous Articles.

SILVER MEDALS.

Turnwrest Ploughs; Ransomes and Sims (4361).

Clodcrusher, fitted with Shafts and Patent Turntable; Amies, Barford, and Co. (222).

Combined Straw, Corn, and Hay Stacking Machine; Amies, Barford, and Co. (244).

Pair of Patent Wrought-Iron Wheels; Beverley Iron and Waggon Company (945).

Diamond Millstone Dressing-Machine; Bryan Corcoran and Co. (3394).

Patent Tube-Well and Pump; J. Lee Norton (3549).

Patent Revolving Archimedian Screw Ventilator; J. Lee Norton (3569).

Patent combined Revolving Liquid Manure Drill; Clayton, Shuttleworth, and Co. (5471).

Patent Stone Breaker; H. R. Marsden (5742).

Patent Safety Steam Boiler and Superheater; James and Frederick Howard (1289).

COMMENDED.

Improved Grindstone-Frame for Grinding Reaping-Machine Knives; William Smith (2648).

Chaff-Cutter with Leather Strap and Pulleys; James and George Haywood (3009).

Round Combined Bin and Trough, with Patent Self-supplying Action; William Coleman and Peter Love (1378).

Long Combined Bin, Trough, and Hay-Rack; William Coleman and Peter Love (1379).

Patent Road Locomotive Crane Engine; Aveling and Porter (5970).

Tile and Brick Machines.

PRIZES.

	£.	s.	d.
Brick-making machine, J. Whitehead (5655)	7	10	0
Tile-making Machine, ditto (5652)	7	10	0
Brick-making Machine, J. D. Pinfold (5405)	5	0	0

Draining Tools.

SILVER MEDAL.

Set of Draining Tools, Hunt and Pickering (854).

The Tables above will show the Awards of the Judges of the Miscellaneous Department, but will be no guide to the weary task allotted to them in having to look over the goods deposited in sheds extending to the length of 2 miles and 30 yards—the implement sheds being 9500 feet long and the machinery in motion 1150 feet. In the weather which signalised our meeting we must say that it was very hot work to inspect such an immense collection of articles, exceeding by 1565 the number collected together at any previous show, whilst there were not less than 105 more stands. The time fixed for the Miscellaneous work was from July 14th at 5 P.M. terminating on Wednesday evening the 15th.* To this task was added the trials of brick and tile machines; the yard being opened on Wednesday at 5s. to see the said trials. The Judges began at 9 A.M., and this work was not finished till 5·30. Owing to the quality of the clay given by the Society and the heat of the weather combined, we can truthfully say that all trial was a complete failure.

Under these circumstances we allowed the exhibitors to use their own clay or what friends brought them, but failure was the predominant rule, and they one and all worked so unsteadily that we cannot pretend to give the tables of power required. As to the quality of work done, the awards must tell what was the opinion of the Judges; but we must add, that, if this time of the year for trials of steam-ploughs be bad, it is still worse in such a tropical season for any men or their machinery to make bricks, and more particularly to make straight tiles, except under properly-constructed sheds and the usual appliances of a regular tilery. We must leave these trials to the kindness of the public who witnessed them, and who would see that we worked hard to make them efficient.

Without wishing to deal hardly with the Implement Committee, we must say that one day for the Miscellaneous Department of this year (more so than at any previous meeting of the Society) was far too little. If four days had been allowed we could perhaps have given a very good account of the numerous and various articles exhibited; notwithstanding that there are many entries of goods that are really anything but agricultural.

* We were allowed Thursday by the Stewards, but had to work on Friday morning.

We venture to make the following remarks on some of the articles to which we awarded Medals, viz.:—

(222). The Patent Turntable is a great improvement to heavy rollers, because all strain is taken from the horse in turning on the headlands, and the wheat or barley or any seed sown is nowhere likely to be twisted up.

(244). The Hay-stacking Machine, also applicable for stacking straw (when threshing with steam), is an excellent invention. For hay-stacking it enables the farmer to carry his stacks to a great height, and the raising the elevation gives room for a horse to work under it. By carrying up a stack to this great height, both straw and labour are saved in thatching, and the more pressure hay receives the better its quality, if properly put together.

(394). The Diamond Millstone Dresser is very clever, and where a regular stone-dresser cannot be had must be of service.

(3548). Patent Tube-Well and Pump. On this we say but little; it answered perfectly, and was highly appreciated by every individual who saw it.

(3569). Screw Ventilators—recommended for the cure of down draught in chimneys, and also for ventilating stables and warehouses—ought to be effective.

(5471). The Revolving Liquid Manure and Drop Drill, exhibited by Messrs. Clayton and Shuttleworth, is very clever and simple, and must, we think, answer well. We wished for a trial but were prevented by the shortness of our time, as well as owing to the fact of the article being shown out of its right year. Thanks to triennial trials!

(5742). The "easy going" Stone Breaker speaks for itself.

(1289). The Patent Steam Boiler of Messrs. Howard is well worthy of the attention of engineers and others who use fixed engines.

The articles "Commended" were considered well worthy of being noticed, and we recommend them to the attention of agriculturists.

Taking a retrospective view of the Showyard, we call to mind several stands well worthy of notice in addition to those we have dotted down. And first we must remark on the two sheds occupied solely by the goods of Messrs. Hunt and Pickering, of Leicester, and numbering 403 articles, amongst them being a set of Draining Tools, for which we awarded the Silver Medal. We know not of such an effort having been before made to meet the Society in any town which they have visited, and hope that Messrs. Hunt and Pickering's example may be followed at many future meetings.

The Special Steam Pump of Messrs. Tangye Brothers and Holman (5537) appears well adapted for the purposes named in the Catalogue, being remarkable for strength and simplicity; but as we had not time properly to inspect it, we refer our readers to the Judges' Report of last year.

The Oil Tester of Messrs. Norton (3587) seems really to test the lubricating properties of oil most satisfactorily.

After rushing past about forty-five sets of ploughs and harrows in Stand 174 (Messrs. Ransome and Sims), which articles had been under the inspection of competent men in the "baked" up fields, we found "The Star" Haymaker, a newly-improved implement (why so called, having first arisen in the "West," we know not), and we recommend it to the notice of farmers at the next trials of such machines. We, of course, could not undertake to try it; but if it be really a good thing, as it appears to be, whether the makers or the farmers are the greater losers we leave to others to decide. While, however, upon the subject of hay-makers, we may mention that among the horse-rakes we had many improvements pointed out, especially one by Mr. R. Boby (324), for a new Patent Semi-self-acting Horse-Rake; but how it will act in practice we

cannot say; the driver, instead of lifting the rake to unload it, lets go the handle, and it clears itself. To justify us in making any further remark, it would be quite necessary for us to see the implement at work. In fact, the establishment of triennial trials seems to require that the Judges of Miscellaneous Articles should have time allowed for the trial of any implement into which some supposed improvement may be introduced, and which they may consider deserving of attention. For instance, we have spoken of novelties in a liquid manure-drill, a hay-maker, and a horse-rake. Because it is not their special year of trial it is no valid reason why a Society like ours should wait for probably two years before it announces this improvement to the public. The Society ought rather to be on the "look out" for advanced movements, and should be the first to herald them forth for the benefit of farmers. It is absurd to defer any deserved commendation of an implement because it belongs to a special class assigned to a special year. If the improvement be sufficient, let it be at once published under the Society's authority. It cannot prejudice the decision when the great triennial competition comes round, nor can it give any undue advantage to an exhibitor so long as the Society provides men who will decide on the strict merits of the machine.

To us it appears that the "Miscellaneous" Judges should commence their work at the same time as the other Judges. The alteration in this rule at Leicester was fraught with inconvenience and disadvantage. All the medals might thus be carefully awarded (after any necessary trials had been made) on the evening before the first public show-day. It is due to successful exhibitors that it should be so; and any lighter subjects requiring commendation might be left till the following morning, if they had not received previous attention. But some one exclaims, "This would make it necessary to have *all* articles in the yard a week before the first show-day." Not so; although it seems that the attendance of the Judges was this year deferred until Tuesday night, the 14th, in consequence of the implements not being in the yard. Exhibitors would simply have to be informed that all implements qualified to compete for medals must be in the show-yard at the time field trials commence; and this regulation would not at all necessitate the whole of the non-competing articles being sent in at so early a period, nor would it drive the Judges into the scarcely justifiable haste of selecting in four-and-twenty hours half a score of the best and most original points of interest in a catalogue of over six thousand articles, forcibly reminding them of a somewhat parallel position of unpleasantness, of people—

> "Doomed to the hardest fate of man alive,
> To make three guineas do the work of five."

In fact, days required to be multiplied into weeks to judge of all that was "novel in application or an improvement in detail."

We hope that all visitors saw the Combined Reaping and Mowing Machine (1507) of Messrs. Hancock and Foden, on an entirely new principle; but of course we could not see it tried, and doubt whether it was not as difficult for the consulting engineer as ourselves to make calculations on its probable effectiveness. We understood, however, that it never had been tried, and we never found the owners at their stand. Stand 51, occupied by W. F. Johnson, of Leicester, had a very large collection of useful and also of ornamental goods, —ploughs, rollers, harrows, corn-drills, garden-seats, ice-safes, and "what-nots." The new implement by W. Smith of Foston, Yorkshire, in the shape of a 16-feet Self-feeding Sheep-Rack (3493), suitable for all kinds of food, the price being 7*l.* 10*s.*, was in our estimation a good and very cheap article. The Cooking-Ranges of W. Barton, of Boston, Stand 99, were neat in appearance, and apparently economical in their consumption of fuel.

A Patent Corn-Screen, with a Revolving Brush underneath (2698), by Thomas Corbett, of Shrewsbury, appeared very effective, and the Brush easily removable. We should have made remarks on the Revolving Harrow of Messrs. Holmes of Norwich, but find it was tried and "highly commended" by other Judges.

In conclusion, we must say that the Department this year was very Miscellaneous indeed. The work of proper inspection was prevented by the short time allowed; but nothing that can be called strictly *new* for the general use of farmers was to be found, though many "machines" seemed—so to speak—to think themselves hardly used for not being considered agricultural implements! To one and all of the exhibitors, whether winning or losing, our thanks are due for their general civility and kindness. While such a temper exists the Society is sure to flourish; but we again say that our time was so limited, and the sun was so hot, that we do not think we can have given satisfaction. We did our best, however, and hope that the Society and its members will be satisfied.

We thank the Stewards, as well as the Consulting Engineer, Mr. Amos, for their repeated assistance and advice.

EDWARD WORTLEY.
JOHN THOMPSON.
H. B. CALDWELL.

Report of the Judges on Steam Cultivation at Leicester.

THE Society having thought it advisable to allow an interval of a few years to elapse between the competitive trials of Implements for Steam Cultivation have not, since the Newcastle Meeting in 1864, brought the subject under the notice of the Judges, until this year at the Leicester Meeting, when the following Prizes were offered:—

CLASS I.—The best application of Steam Power for the Cultivation of the Soil.

First Prize	£100
Second Prize	50

CLASS II.—The best application of Steam Power adapted for Occupations of a Moderate Size.

First Prize	£50
Second Prize	25

CLASS III.—For the Class of Implements for Steam Cultivation, including Ploughs for Steam-power, Cultivators, Harrows, Windlasses, Anchors, Rope Porters, &c.

Prize	£100

In addition to the above, the Viceroy of Egypt, as a memento of his visit to Bury St. Edmund's at the time of the Meeting there of the Society, offered a magnificent piece of plate of the value of 200*l.*, for the best implement for the cultivation of the soil by steam-power, suitable for foreign countries where repairs are difficult to execute. Before we enter into the details of the trials, we may state that the Council had intended that they should be of a preliminary character only, and that a further trial should be made in the autumn, when the crops had been gathered; on commencing our trials, however, it soon became apparent to us that, as regards the relative merit of the different

systems and implements (with the exception of the windlasses), we had ample means at our disposal of arriving at a correct judgment. Considering these circumstances, and the great expense to which the Society and the Exhibitors would be subjected by a second trial in the autumn, we thought it our duty to lay the facts before the Stewards, in order that they might determine whether or not it would be expedient to have the double set of trials. The Exhibitors, on being consulted by the Stewards, unanimously came to the resolution that they did not wish the second trials to be carried out, and therefore the Council determined that the Leicester trials should be final.

The progress of steam-cultivation since the trials at Newcastle, in 1864, has been eminently satisfactory, not so much on account of novelties introduced, or striking improvements adopted; for with the exception of a strengthening and perfecting of details, there is in reality little that is new—but because the merits of steam-cultivation have become largely understood and appreciated—because tenant-farmers occupying areas sufficient for the employment of steam have adopted it, and have not only not been disappointed, but, on the contrary, have found great benefit from its use—because those occupying smaller farms have gladly availed themselves of the opportunities of making use of steam-power by hire—and because the cereal produce on strong land has manifestly increased under the influence of steam-cultivation; for all and each of these reasons we may safely assert that a great work has been done.

The elaborate reports of the Inspection Committees appointed by the Society, in which are recorded the results of steam-cultivation on 135 selected farms, have undoubtedly gone far to open the eyes of the less sanguine and adventurous to the advantages to be reaped from steam-culture. It is a gratifying fact suggestive of the influence of the reports, that our principal makers of steam-cultivating machinery have been unusually busy during the last ten months, and that the home-trade has never hitherto been so active. We may fairly assume that steam-cultivation is now a well-established fact, and may reasonably conclude that in process of time the steam-engine for cultivating purposes will be commonly used upon every farm, and be as thoroughly appreciated as the thrashing-machine.

We commenced our duties on Wednesday, July 8th, by selecting from the Show-yard such machinery for steam-cultivation as we deemed it desirable to test; we then adjourned to the trial-fields situate about one mile from the Show-ground, in the parishes of Knighton and Aylestone. The fields were generally small, varying from 7 to 15 acres; the surface tolerably level. Under ordinary conditions the soil would have come under the description of strong loam with stones, and would not have been considered stiff, or by any means difficult to move. But having been undisturbed since the previous corn was sown, and being thoroughly baked by the extraordinary heat of the weather, its hardness was excessive; and the working of it afforded an admirable test of the strength of the implements, as well as the power of the engines. About 100 acres were devoted to steam-cultivation, and the work of the first day consisted in selecting various fields for the different trials, marking out lots, and getting the machinery into place, our directions being admirably carried out by Mr. Elphick, the field-steward.

As at Newcastle a preliminary trial was considered necessary, in order to ascertain the peculiarities of the various systems, and to decide as to which class each came under, if a further trial were required. In these preliminary trials it was proposed to allow one hour to each, and to notice the area, the depth, and the quality of the work.

At this stage it may be well to enumerate the various systems which entered into competition.

Messrs. Fowler and Co., of Leeds, exhibited four different systems:—

Catalogue Number.

2482. Two Traction Engines (each furnished with one winding-drum) to move on opposite headlands, and draw the implements to and fro between them.

2483. Two Traction Engines (each furnished with two drums) to move on opposite headlands, and intended to work two implements at the same time to and fro between them.

2485. One Traction Engine, furnished with patent clip-drum, to move on one headland, to work with a travelling disc anchor, moving on the opposite headland.

2484. One Double-drum Traction Engine to move on one headland, and work with a travelling disc anchor, moving on the opposite headland.

Messrs. James and Frederick Howard, of Bedford:—

1194. Apparatus consisting of Portable Engine, windlass, snatch-blocks, anchors, and porters, on the roundabout system.

Messrs. Aveling and Porter, Rochester:—

5967. Traction Engine, separate windlass (Fowler's patent), snatch-blocks, anchors, and travelling porters, on the roundabout system.

Messrs. Tasker and Sons, Andover:—

5516 & 5517. Traction Engine, by Clayton, Shuttleworth, and Co., driving windlass by strap, snatch-blocks, anchors, and porters, on the roundabout system.

Mr. E. Hayes, Stony Stratford, Bucks:—

15 & 16. Portable Engine, windlass driven by strap, snatch-blocks, anchors, and porters, on the roundabout system.

In addition to the above we had to adjudicate upon a large collection of steam-driven implements, ploughs, cultivators, diggers, harrows, rollers, &c.

Class I.

The prizes in this class being offered for the best application of steam power for the cultivation of the soil, without regard to the extent of the occupations, we had no hesitation in restricting the entries to such systems as worked on the direct principle, believing that on large areas steam could be more economically and efficiently employed in this way than on the roundabout system.

Having come to this conclusion, it was apparent that Fowler and Co. were alone in the field, and the only point to determine was which of their systems was most meritorious.

The absence of Messrs. Howard's double engines was a source of much regret to those who had visited the trial fields anticipating a keen struggle between the celebrated firms of Fowler and Howard.

Thursday afternoon and Friday were devoted to the preliminary trials of all the systems, these trials being, so far as regards 2482 (the two single drum engines) and 2483 (the two double drum engines of Fowler's), also the final trials.

We will now describe Fowler's systems, in the order given above:—

No. 2482 consists of two 10-horse power single cylinder traction engines, with one winding drum each, such drum lying in an horizontal plane, that is, having its axle vertical. The drum is placed below the boiler, and is driven by a spur wheel on the circumference of the drum, receiving motion from a

a pinion on the lower end of an upright shaft, driven by bevil wheels from the fly-wheel shaft of the engine, and put in and out of gear by a clutch.

On the upper side of the drum is a break surface, surrounded by a break band, the upper edge of this band is notched to receive a paul, which falls into the notches and arrests the band when the drum is paying out, but permits the band to revolve freely with the drum when the latter is winding in. This automatic arrangement of break band insures a definite strain on the tail rope, which strain, however, can be varied (before starting) at pleasure.

This arrangement being automatic, renders supervision by those in attendance unnecessary. The coiling of the rope on the drum is also automatic. This is performed by a lever, having its fulcrum on a fixed pin attached to the framing, and placed below the drum, the inner end of the lever being caused to rise and fall by the action of a cam, worked off the drum by spur gearing.

The outer end of the lever projects beyond the circumference of the drum, and carries two guide pulleys, between which the rope passes in its way to the drum. In this manner, as the guide pulleys rise and fall by the action of the cam, they coil the rope on the drum with the greatest regularity, a point of very considerable importance, as it saves the machinery from jars in the winding on, and the rope from unnecessary wear and tear. The mode of working a pair of these traction engines, with their single winding drums, is now so generally known, it is almost superfluous to state that in operation one engine is upon the one headland and the other on the opposite, and that the rope is alternately wound and unwound from each engine, carrying the plough or cultivating implement with it from headland to headland, the movement along the headlands being effected by the progressive motion of the engines themselves.

This system, therefore, has the important advantage of doing away with all anchor carriages and snatch-blocks.

It is from this cause, and from the fact of each engine being competent to travel about and take its own place, that this system can be got to work within from three to five minutes, according to the length of furrow, from the time of the engines entering the field. In the present instance, the furrow was about 9 chains in length, the engines were placed on the upper headland, and three minutes sufficed for one engine to traverse the field, laying out rope, and drawing the cultivator behind it.

Experiment No. 1.—A patent balance 5-tined extra strong cultivator, with bevel beams, was first tried; the average measured depth was 7½ inches, corresponding to a weight of 40 stones 4½ lbs. per superficial yard, the bottom fairly level throughout; the points on the cultivator being 2½ inches wide, and made of chilled iron. Owing to the extreme hardness of the bottom, the wear on the points was excessive, and three required to be replaced, the change occupying 3 minutes, the time required to reverse the implement at the headland varied from 10 to 14 seconds—averaging 12 seconds.

The rate at which the implement travelled was much less rapid than under ordinary conditions; the average run occupied 3 minutes, or equal to 2 to 2½ miles per hour. The usual complement of attendants consists of 2 engineers, 1 ploughman, and two strong lads for the porters, who assist in reversing the implement; in addition to the above it is good policy to employ one extra man unattached, to generally superintend and lend a hand when required.

The time of working, including setting down, was one hour; the area disturbed 3 roods 25 perches, equal to about 9 acres, for a day's work (10 hours); a good result, the state of the surface being considered.

Experiment No. 2.—A 7-tined balanced cultivator, 2498, was next worked with 6 tines, five actually in work, the sixth running in the furrow steadied

the motion of the implement, and insured all the ground being moved. The average measured depth was 6¾ inches, corresponding to a weight per superficial yard of 35 stones 12 lbs., the bottom more even than in the previous experiment. The width cultivated at each turn was 4 feet 6 inches, whilst the implement, if furnished with all its tines, was calculated to disturb 5 feet 3 inches. The time of work was again one hour, the area cultivated 3 roods 6 perches; 7 acres 3 roods 20 perches per day of ten hours.

Experiment No. 3.—The last implement, which was worked by the pair of single drum engines, was a four-furrow digger (2494), which can be used as a plough by substituting mould-boards for the skeleton breasts.

The depth of the digging varied; at first the depth was greater than afterwards, when, owing to the hard bottom, the shares became much worn. The average depth was 8 inches, corresponding to a weight of soil moved per superficial yard of 43 stones 4½ lbs. The floor was left very even. The time of running was 1 hour, the area dug 2 roods 11 poles, being at the rate of 5 acres 2 roods 30 perches per day.

The pace at which the implement moved was barely 2 miles per hour.

We may here notice a very simple alteration which has been made by Messrs. Fowler in all their balance implements, viz., the application of an arm consisting of a bar of iron projecting slightly upwards from each end of the implement, over a hook in this arm the tail rope is carried, and the considerable pressure thus obtained tends to keep the implements steady to their work, and counteracts the vibration caused by the uplifted frame at the forward end of the implement.

The cost of the two engines, with the rope porters and 800 yards of steel rope, is 1224*l.*; the 5-tine cultivator costs 60*l.*, making the total cost 1284*l.*

No. 2423, *Fowler's* two 10-horse power single cylinder traction engines, with two winding drums on each engine, are generally so similar to the single drum engine, 2482, that they may be described in a few words, by saying that the difference between these engines and 2482, consists simply in their having each two drums, the drums themselves being similar to the single drum of 2482. The mode of employing these engines is novel; one of them is placed on each headland, and there are two ropes and two cultivating implements passing from engine to engine.

In this way both engines have one drum each at work at the same time, and one drum each unwinding at the same time. It is intended that the implements, starting simultaneously from the two engines, should traverse half the width of the field, meeting in the middle, and then return to their respective engines.

We consider this a costly and complicated system, which has been called forth by a fancied objection that has been urged against the two single drum engines (namely, that only one engine is working at a time), but is not a real improvement in the art of steam ploughing, and we believe that any theoretical advantage apparently due to the fact of both engines working at the same time, is more than counterbalanced by the extra cost and weight of the engines,* and, above all, by the fact, which was proved in the experiment, that it is not possible in practice to make the two implements perform their journeys with such regularity that the engines should work without interruption. It appears to us that even with the best management, a stoppage arising from one engine having to wait for another is inevitable.

The method of working the double drum engine is as follows:—The two

* In actual practice it is found that for the short time one engine stands, whilst the other is ploughing in the single drum system the steam can very well be accumulated, and that therefore a smaller boiler is sufficient.

engines being placed on opposite headlands, one cultivator is set to work first, in order to leave room for the other to pass without coming in contact. In finishing work, it follows that more work is done on one half the ground than on the other.

Starting from the opposite ends at a given signal, each engine must be driven like clockwork, otherwise the cultivators do not reach the centre at the same time; the one must wait for the other, and in this way, even in the hands of Fowler's experienced workmen, from 40 to 50 seconds were frequently lost. The cultivators were each fitted with 5 tines, the average depth worked was about 5½ inches, corresponding to a weight of soil moved per super yard of 28 stones 9 lbs. The bottom was not particularly even. The hands employed were 2 engineers, 2 drivers, 2 porter boys, and several extra hands assisting.

Aveling's travelling porters which were used, have been improved since the Newcastle meeting.

In these trials the system really condemned itself, and we have no hesitation in passing over in our award of prizes this complicated arrangement, which was clearly unmanageable, even by the most skilled hands. The area cultivated in one hour was 1 acre 1 rod 31 perches, being at the rate of 14 acres 1 rod 30 perches per day of 10 hours, a poor result, considering the small depth to which the soil was moved, and that a double set of implements, of porters, of implement men, and porter-boys were employed, that 1600 yards of rope were in use in lieu of 800, and that the apparatus, with the two implements, cost 191*l.* more than the pair of single-drum engines, No. 2482, and the one implement. Although we have thus most unhesitatingly condemned the use of two engines, each having two drums, we think it right to call attention to the fact that the employment of two such engines admits of means of utilizing in aid of the traction the strain on the tail-rope, while, as far as we know, no such means are applicable in the case of the two single-drum engines, but Messrs. Fowler had not applied this means to their double-drum engines, and even had they done so, it would not have altered our award, because we consider the defects of the system too great to be counterbalanced by a saving in power; we shall have, however, to revert to this question when describing Messrs. Fowler's fourth direct-acting system, viz., that in which the double-drum engine is used in conjunction with a travelling anchor.

No. 2485 consists of one 8-horse power traction engine, fitted with Fowler's patent clip-drum, working in connexion with a travelling disc-anchor, and drawing an implement fitted with slack gear. This is the old system, and it is the only one in which at present the strain upon the tail-rope is utilized in aid of the traction.

A little consideration will make it obvious how, in the clip-drum, this advantage is obtained; that side of the rope which passes from the cultivating implement to the drum, and which rope is hauling the implement, clearly has upon it as much strain as is necessary to pull the implement through the soil, and to pull out the tail-rope; but the rope which is coming off the other side of the clip-drum is that very tail-rope itself, which has its own proper tension as tail-rope. Thus the power required on the one side of the drum to haul the implement and the tail-rope, is balanced by the strain on the other side of the drum, produced by the tail-rope itself, so far as that strain extends; and, therefore, it is merely the *difference* between the strain of the tail-rope and the strain of the implement-rope which the engine has to work, instead of being the whole strain of the implement-rope unreduced by that of the tail-rope. This saving in power is probably fully equal to the difference between the power of the 10-horse power engine used in one case, and the 8-horse power engine used in this case.

The clip-drum has so long been before the public, and is generally so well known, that a few brief words will suffice to describe the apparatus. It is a

sheave revolving on a vertical spindle placed below the boiler of a traction engine, and driven much in the same way as the drum of either the single or double-drum engine. The edge of this sheave is furnished with the clips (hinged jaws), which close upon the rope, and thereby enable the drum (although the rope merely bears on half the circumference of the drum) to make an efficient grip upon that rope and to haul it.

Below the clip-drum is a coiling-drum, for the purpose of receiving the rope when the apparatus is out of use and is travelling from field to field. The endless rope, which passes round the clip-drum, is carried to the opposite headland, and there passed round the sheave of the travelling disc-anchor. This again is a well-known implement, consisting of a grooved-pulley to receive the endless-rope, which pulley is supported on a frame provided with sharp cutting disc-wheels, competent to cut their way deeply into the soil, and thereby resist the lateral strain of the endless-rope. Movement along the headland as the work progresses is effected by means of a small windlass, set in motion by a friction-band from the pulley-wheel, which windlass coils a rope attached to a fixed point forward on the headland.

The anchor-man can at any point release the friction-band which drives the windlass, when the movement is instantly stopped.

Besides the advantage of utilizing the strain upon the tail-rope, which is happily a necessity of the clip-drum arrangement, there are other meritorious points, amongst them the simplicity, cheapness, and lightness of the apparatus.

On the other hand it is asserted by some persons, but we know not with what truth, for the counter assertions are equally strong, that the clip-drum wears out the rope more than other systems do, that the clips themselves require frequent renewal or readjustment, and that the ingenious piece of machinery, "the slack-gear," on the implement by which the rope keeps itself always tight, is apt to get out of order; as we have said, we do not think these allegations are proved, and *it is indisputable that the work done in proportion to the original cost* of the apparatus, and to the *power employed*, is, as we should have expected from the utilization of the strain of the tail-rope, far greater than that exhibited by any other system that came under our observation.

On the Saturday this engine was tried with the following results:—in 1 hour 49½ minutes, it cultivated 1 acre 3 roods 16½ perches, or equal to 1 acre and 2 perches per hour, or 10 acres and 20 perches per day of 10 hours. The pace of travelling was over 2½ miles per hour, the weight of soil moved 30 stones 4 lbs. per superficial yard, or 916 tons per acre, corresponding to a depth of 5⅞ inches, while the number of tons moved per nominal horse power per hour was 114½. The cost of the engine with the travelling anchor, and 800 yards of wire-rope, and 20 rope-porters, is only 648*l.*

The last system exhibited by Messrs. Fowler and Co., in Class I., consisted of the double-drum engines, working with a travelling disc-anchor, and we look upon this as a very practical application, and one likely to supersede to some extent the clip-drum, provided the objections made by some persons to the clip-drum, and to which we have alluded, are valid. Worked in this way we regard the double-drum engine as a really useful machine to the farmer, which, as far as we can see, it never would be, if worked in pairs as already described.

In order, however, that a double-drum engine, applied to a travelling-anchor may successfully compete with a clip-drum in point of economy of power, it is absolutely necessary that an apparatus be applied to it, by which the strain of the tail-rope may be utilized in aid of the traction; such an apparatus was used many years ago by Messrs. Fowler in their windlasses, for the roundabout system, and we can see no practical difficulty in applying it to the double-drum; that this is an important point will be readily understood, when we state that at a little over 2½ miles per hour, an ordinary low strain

on the tail-rope if not utilized, absorbs 3¾ horse power of 33,000 lbs. lifted 1 foot high per minute.

Messrs Fowler and Co. worked with the above double-drum engine a 4-furrow balance plough, fitted with Kent breasts, the latter differing materially from the ordinary turn-furrow, in being longer, inclining upwards at a greater angle, convex, and narrow, with an uniform surface from end to end, the advantage consisting in getting rid of the furrow, without the squeeze and pressure which, in ordinary ploughs consume considerable draft. The work was admirable considering the state of the ground. Owing to the lateness of the hour, the trial was only continued for 29 minutes, and the small area ploughed was not computed, we, therefore, also in this instance give the results of the Saturday's working. On this occasion the 6-tine cultivater was used, and in 1 hour 18 minutes 1 acre and 33 perches was cultivated, being at the rate of 3 roods 28 perches per hour, or 9 acres 1 rood 4 perches per day of 10 hours; the weight moved was per superficial yard 35 stones 2 lbs., corresponding to a depth of 6¾ inches, or 1063 tons per acre; the work done was admirable. The price of one of the engines, with 1200 yards of rope, 20 rope-porters, and 1 disc patent travelling anchor was 766*l.*

Having carefully considered the advantages of the four systems which have been so fully described, we unanimously decided that the best mode of direct steam cultivation brought under our notice is that in which a pair of single-drum engines working on opposite headlands draw the implements to and fro between them. There is a simplicity and adaptability in this system which does not appear to exist in any other.

With regard to the second prize, we have thought it right to divide it equally between the clip-drum with travelling-anchor, and the duoble-drum engine with travelling-anchor; both systems possessing much merit, and affording opportunities for direct steam cultivation, in cases in which the best application could not be adopted.

Our awards therefore are as follows :—

First Prize, of 100*l.*, to John Fowler and Co.. for their two engines with winding-drums (No. 2482).

Second Prize, of 25*l.*, to John Fowler and Co., for their clip-drum engine and travelling-anchor (No. 2485).

25*l.*, to John Fowler and Co., for double-drum engine and travelling-anchor (No. 2484).

The following Table will exhibit the results of the trials in an easy form for purpose of comparison. (See following page.)

We believe that neither this Table in Class I., nor that which is to follow in respect of Class II., requires much explanation beyond that which can be obtained by reading the headings of their columns.

It will no doubt be remarked that there is not in the Table any column to contain a statement as to the amount of coal consumed. This point was not lost sight of by us, but we felt that unless several hours were allotted to each trial, no reliable result as to the coal consumed could be arrived at; we therefore determined not to run the risk of tabulating results which might be to a large extent affected by circumstances into which we will not now enter, but which will readily occur to those who have been engaged in steam engine trials.

We had the less regret in omitting the record of the coals consumed, because at the present day so many farmers know from their own practical experience the amount of fuel required for the daily work of portable engines of a given number of nominal horses power. It therefore appeared to us that when we stated the nominal power of the various engines and the respective acreages cultivated per day, we had put the practical farmer into possession of those elements which would enable him to arrive at the cost per acre of fuel, oil, tallow, and other such matters.

IMPLEMENT TRIALS AT

THE BEST APPLICATION OF STEAM POWER FOR THE CULTIVATION

Name of Exhibitor.	System.	Catalogue Number.	Engines, Implements, and Apparatus Employed.	Cost.	Observations.	Means of Transport.	Number of Men and Lads Engaged.
				£.			
Fowler	Direct	2482	2 Single Cylinder Traction Engines, 10 inch Cylinder, 1 foot Stroke, each with single Drums, 800 yards of Steel-wire Rope, and 10 Porters, cost 1224*l*.	1284	..	The Traction-engines themselves.	Engines . 2 Plough . . 1 Porters . . 2 — 5
,,	,,	2505	A 5-Tine Balance Cultivator (extra strong), cost 60*l*.				
,,	,,	2498	Ditto, but with a 7-Tine Cultivator, 6 Tines in work.	..	..	..	..
,,	,,	2494	Ditto, but with a 4-Furrow Digger	..	..	..	..
Fowler	Direct	2483	2 Single Cylinder Traction Engines, 10 inch Cylinder, 1 foot Stroke, each with double Drums, 1600 yards of Steel-wire Rope, and 20 Porters, cost 1355*l*.	1475	..	The Traction-engines themselves.	Engines . 2 Ploughs . . 2 Porters . . 2 — 6
,,	,,	2505, 2506	2 5-Tine Balance Cultivators, cost 60*l*. each				
Fowler	Direct	2485	Traction Engine with Clip Drum, 8½ inch Cylinder, 1 foot Stroke, 800 yards Wire Rope, 20 Rope Porters, and a 5-Disc Travelling Anchor, cost 648*l*.	708	In getting to work the rope was coupled up across by mistake, this caused the time in getting to work to be much longer than it would otherwise have been.	The Traction-engine itself.	Engine . . 1 Plough . . 1 Anchor . . 1 Porters . . 2 — 5
,,	,,	2505	Balance 5-Tine Cultivator, with Slack Gear, cost 60*l*.				
Fowler	Direct	2484	Traction Engine with double Drum, 1200 yards of Steel-wire Rope, 20 Rope Porters, a 6-Disc Patent Travelling Anchor, cost 766*l*.	836	..	The Traction-engine itself.	Engine . . 1 Plough . . 1 Anchor . . 1 Porters . . 2 — 5
,,	,,	2498	7-Tine Cultivator, 6 Tines in work, cost 70*l*.				

LEICESTER.—CLASS I.

OF THE SOIL.—TABULAR STATEMENT OF SYSTEMS TRIED.

Time occupied in travelling from starting place to Trial Field.	Time occupied in getting ready to work after entering Trial Field.	Nominal Horse-power of Engine.	Time at Work.		Area Cultivated.			Area Cultivated per Day of 10 Hours.			Weight of Earth moved per Superficial Yard.	Depth of Earth moved.	Tons of Earth moved per Acre.	Tons of Earth moved per Hour.	Tons of Earth moved per nominal Horse-power at Work per Hour.	Nature and Condition of the Soil.	Quality of the Work.
Min.	Min.		H.	M.	A.	R.	P.	A.	R.	P.							
Were in the Field.	3	2 10-H. P. working alternately.	1	0	0	3	25	9	0	10	564¼ lbs., calculated from the depth.	7½ inches measured.	1219	1105	110½	Strong Loam with Stones.	Sole good and level.
..	..	..	1	0	0	3	6	7	3	20	502 lbs., calculated from the depth.	6¾ inches measured.	1084	854	85½	,,	,,
..	..	..	1	0	0	2	11	5	2	30	606 lbs., calculated from the depth.	8 inches measured.	1309	744	74½	,,	Very even and smooth floor.
Were in the Field.	9	2 10-H. P.	1	0	1	1	31	14	1	30	401 lbs., calculated from the depth.	5½ inches measured.	866	1250	62½	,,	A fair bottom.
5⅓	29	8 H. P.	1	49½	1	3	16	10	0	20	424 lbs.	5⅝ inches, calculated from the weight of soil moved.	916	928	116	Seeds pastured after Barley. Light land, but very dry and stony.	Very good.
7¼	18¼	10 H. P.	1	18	1	0	33	9	1	4	492 lbs.	6¾ inches, calculated from the weight of soil moved.	1063	986	98½	,,	Very good.

Class II.

The best application of Steam Power adapted for Occupations of Moderate Size.

In this class were tried four roundabout systems, and two direct acting systems.

The deciding trials took place on Saturday, July 11th, in a field of about 12 acres, previously divided into six portions.

The competitors were arranged as follows:—

Lot 1, Aveling and Porter }
Lot 2, J. and F. Howard } Roundabout.
Lot 3, Tasker and Sons }
Lot 4, Fowler, with clip-drum and travelling disc-anchor. Direct.
Lot 5, Edward Hayes, Roundabout.
Lot 6, Fowler, with double drum engine and travelling disc-anchor. Direct.

On Friday night the above were ordered to place themselves in a field about a quarter of a mile from the scene of action.

The engines and tackle were drawn up side by side. The different sets were started so as to work clear of each other. The time of travelling to the field, with all particulars as to the mode of progression, whether by horse-power or traction; the time occupied after reaching the field in preparing for work; the time occupied in actual work; and the nature of the work ascertained by numerous observations, and by actual weight of soil moved, were all data by which we were enabled to arrive at a decision as to the merits of the different systems, which systems we will now describe:—

Lot 1.—Aveling and Porter, who by their excellent traction-engine work, Fowler's implement and Fowler's winding-drums, exhibited a combination, consisting of a 10-horse-power traction-engine, No. 5969, price	£ 420
Working Fowler and Co's roundabout apparatus, comprising double-drum windlass, cultivator, porters, snatch-blocks, &c. (5067)	250
	670

If with eight of Aveling's travelling-porters, in lieu of ordinary porters, then 18*l.* extra.

The windlass consists of a strong axle, supported upon carrying or bearing wheels; on this axle the two drums run loosely.

The drums are furnished with spur-wheels at their outer edges, into which gear at all times two pinions (also loose) upon the driving shaft above. Motion is communicated to this shaft from the steam engine by means of another shaft with universal joints, which allows for a certain amount of irregularity in the adjustment of the windlass relative to the engine. On the top shaft is a long sliding clutch, which can be put into gear so as to drive the pinion of the one drum or the other. The tension upon the outgoing rope is regulated by an ordinary break. The engine must be stopped in order to reverse the drums. The engine named "Leicester," made by the exhibitors, who have devoted much attention to traction engines, appeared to be excellently manufactured, and to possess very great steering facilities, there being a leading-wheel in front of the ordinary steering wheels. The whole steering was readily managed by a young lad.

The time occupied in reaching the field was eight minutes; the time of getting to work after the field was reached was forty minutes. The engine drew after it a waggon carrying the snatch-blocks, anchors, &c.; and also drew a train composed of the windlass, the cultivating implements, and the porters.

The implement used was a 5-tine bevel beam cultivator on the balance principle.

Owing to the extreme hardness of the ground, one share was removed from each end, and the implement took four furrows or breadths at once, going on an average $6\frac{5}{16}$ inches deep, as calculated from the weight moved, and leaving a capital surface.

Notwithstanding the relief afforded by the removal of one share, the work severely tried the anchors, and occasional delays occurred in consequence. This partly accounts for the comparatively small area worked.

The area dug or cultivated was 1 acre 1 rood 17 perches in 2 hours 49 minutes, being at the rate of 1 rood 37 perches per hour, or 4 acres 3 roods 10 perches per day of 10 hours.

In each experiment several portions of the soil were weighed and compared with the actual weight of a portion of solid ground, and the depth moved: the number of tons per acre were thus ascertained.

The weight of the undisturbed soil in this field was as follows: 1 yard square, first 6 inches deep, 30 stones 13 lbs.; second 6 inches deep, 37 stones 5 lbs. The deeper we go down within certain limits, the heavier become a the soil.

The weight of a yard square of the depth cultivated by Aveling and Porter reached an average of 32 stones 5 lbs., or 978 tons 16 cwts. per acre.

The actual average depth in this case, though apparently more, was only $6\frac{5}{16}$ inches, when truly ascertained by calculation of the weight moved.

Lot 2.—Messrs. J. and F. Howard's celebrated "Roundabout" system is too well known to the public to need a lengthened description.

The apparatus (No. 1194 in catalogue) includes a 10-horse-power portable engine by Clayton, Shuttleworth, and Co., a separate windlass, 1600 yards of rope, anchors, and a double-action 5-tine cultivator: price complete, 500*l*. The windlass, driven by a shaft with universal joints, is very efficient and well made, moving the cultivator by a rope properly carried and very well anchored.

The cultivating implement itself (to be noticed later on, among the implements tried), which is double-acting, works with great steadiness, takes a good hold of the ground, and leaves a very level bottom.

It consists of a strong iron frame on 4 travelling wheels, capable of carrying 5 strong tines (4 only were in use), with jocks or points in both directions, various sized soles being fitted in the centre between the points. The tines rock on the frame; the distance through which they rock can be adjusted. This ability to rock is a very important advantage.

In travelling to the field no less than eight horses were employed. The time occupied was 6 minutes in moving, and 58 minutes in preparing for work, —a long period as compared with that of direct systems. It must, however, be borne in mind that sometimes, with a little arrangement, two or even three fields may be cultivated without shifting the engine.

The work when once started was continuous; every part appeared well balanced; and the pace was good, as was proved by the fact that 2 acres 34 perches was moved to an average depth of $5\frac{3}{4}$ inches in 2 hours 14 minutes. The weight of a superficial yard of soil the depth cultivated was 29 stones 10 lbs.

In this windlass, as in all the other detached windlasses, there is not any mechanical means of coiling the rope on the drums; whereas the important point of uniformity of coiling depends upon the skill of the man in attendance, coupled with the judicious placing of the snatch-blocks in front of the windlass.

Lot 3.—W. Tasker and Sons' apparatus consists of a 12-horse power Double Cylinder Traction-Engine, by Clayton, Shuttleworth, and Co. (No. 5516), costing	£ 440
(No. 5517) windlass, ropes, porters, and anchors, by exhibitors; wrought-iron Cultivator by W. Smith, 5 tines	196
	636

The principal novelty in Messrs. Tasker's system is their windlass, which consists of two rope drums, running loose upon a fixed axle, supported by the travelling-wheels of the windlass. Motion is communicated to these drums in the following manner:—Running loose upon the axle already mentioned, and between the two drums, is a driving-pulley, which receives movement from a belt driven from the fly-wheel of the engine. On each side of this pulley is a spur-pinion; these pinions gear into small wheels carried on two short shafts, working in bearings fixed in the drums. These shafts have at their outer ends other toothed wheels, which work in internal spur-wheels, also loose upon the axle. The outsides of these spur-wheels are turned, to act as breaks, and are provided with break-bands, which can be tightened by levers in the ordinary manner. So long as these break-bands are both loose no effect is produced upon either of the drums, although the driving-pulley may be revolving, because the shafts contained in, and carried by, the drums, find less resistance in making the loose internal cog-wheels revolve, than in making the drums themselves revolve; but, so soon as one of the break-bands is tightened, so as to hold its internal geared wheel, then the wheel internal to the drum, causes that drum to revolve.

The other drum is at the same time delivering the slack-rope, and the ease with which it does so is regulated by the adjustment of the break on its internal geared wheel. Thus in this windlass the break is used both to set in motion the winding-drum and to regulate the tension on the paying-out rope. There is no necessity whatever to stop the engine when changing the motion of the drums, the whole of that operation being performed by the slacking of that break-band which had been tight, and tightening that which had been slack. It may be noticed as a point of merit in this windlass that, as the driving is done through the intervention wholly of the friction of a break-band, there is thus ability for the machine to relieve itself in the event of the cultivating implement being suddenly stopped by any obstacle. Although it has been stated above that there is no necessity to stop the engines when the drums are reversed, nevertheless in practice the engineer eases the steam during the time that operation is taking place. This ability of the windlass to yield, in event of an obstacle meeting the implement, is one which renders it peculiarly fitted (by a re-arrangement of the parts) to be driven from the engine by a shaft with universal joints, but (as already stated) the exhibitors have constructed it to be driven by a belt from the engine, which mode of driving is in itself a means of allowing a yielding to take place in the event of the cultivator meeting with a serious obstruction. This driving by means of a belt is attended by certain advantages: one is, the power of yielding mentioned above; another is, that the windlass and engine need not be very accurately placed in reference the one to the other. But there are objections to the use of the strap, the principal one being its liability to become loose, or even to run off in wet weather. To a certain extent this might be guarded against by providing a portable cover for the strap.

We noticed a considerable improvement in the mode of anchoring the snatch-block pulley, which is attached by chains to two claw-anchors fixed at different angles on the headland. When the implement is being turned, the hinder anchor can be detached and brought forward without stopping the implement.

The apparatus was drawn to the field by the traction-engine and 2 horses in 7 minutes, and was got to work in 37 minutes.

The implement—one of W. Smith's cultivators, with 5 tines, furnished with broad feet—was not suitable for the hard and baked surface, and left a very irregular and ridgy bottom, disturbing a considerable depth at one part, and barely entering the soil at another; the work altogether being inferior to any done by Howard's or Fowler's tools.

The area of work done was, 2 acres and 8 perches, in 3 hours 23 minutes, or at the rate of 6 acres and 9 perches per day of 10 hours.

The average depth was only $4\frac{5}{8}$ inches; the weight per superficial yard 318 pounds, giving 687 tons per acre, and 416 tons moved per hour.

The tons moved per hour per nominal horse-power were only $34\frac{1}{2}$, but this small result is in part due to the fact that the engine (12 horse-power) was in excess of the work it had to do, and was worked at much less pressure than other engines.

Lot 4.—Messrs. Fowler and Co.'s 8-horse Clip-drum Engine, with travelling disc-anchor, working one of their 5-tine cultivators, has been so fully described in the other class, that we need only remark that the time occupied in moving to the field was $5\frac{1}{2}$ minutes, preparing for work, 29 minutes.

For the area cultivated, the time occupied in such cultivation, the weight of earth moved, &c., see the record already given in respect of this engine in Class I.

The number of tons moved per hour per horse-power was greater in the case of this clip-drum engine than in that of any other system tried, whether in Class I. or in Class II. This result corroborates the soundness of the views we entertained as to the importance of utilising the strain on the tail-rope.

We have not, however, awarded a prize to this engine in Class II., because we consider its cost—648*l.*, or, with the implements, 708*l.*—renders it unfit to compete successfully in the small-occupation class.

Lot 5.—Edward Hayes, Stoney Stratford, Bucks, exhibited his 10-horse Portable Engine and Patent Windlass, working W. Smith's combined cultivator.

The windlass is ingenious, and deserves notice. It consists of a frame on 4 wheels, provided with a main shaft, in the centre of which is mounted a loose pulley, driven by an indiarubber strap from the engine. On each side of this central pulley is placed another pulley, also loose upon the shaft, having a spur-pinion attached to it. Each of these pinions gears into a pinion on a separate short shaft, turning in a bearing on the under side of the drum.. The other ends of these short shafts are provided with other spur-wheels, gearing into internal wheels attached to the winding-drums, which are also loose upon the shaft; so that if the driving-strap is caused to run on one of the side pulleys, the pinion attached to it drives the internal wheel attached to one of the winding-drums.

To the outside of each winding-drum there is applied alternately (namely, during the time of the running-out of the slack-rope) a break, such break being moved by a long sliding bar, carrying the strap-fork, for shifting the strap from one pulley to the other.

The object of this arrangement is, that when the strap is on one pulley, the break is applied to the winding-drum (the then paying-out drum) on the other end of the shaft, and *vice versâ*. In addition to this arrangement there is a small cylinder, provided with a piston, acting by pressure of the water from the boiler, connected with two other breaks, which are applied to the two side pulleys when the change of motion takes place, and it becomes necessary to stop them. The same lever which moves the bar to move the strap, also opens a valve to allow the water to act in this small cylinder. There is further arranged a stop to hold the sliding-bar in position, the bar itself being always ready to move by a charged spring. Such stop can be withdrawn at pleasure by a long string laid across the field to one of the anchor-men; and this is especially useful in case of accident—if the anchor be out of sight of the windlass, from being round a corner, in the hollow of a field, or in foggy weather. This arrangement has some advantages: the engine can be driven at an uniform speed throughout; consequently the engineer reverses the windlass, and, to some extent, looks after the coiling of the

rope. Working by a strap enables the machinery to be more readily fixed, nice adjustments are not necessary, and an ordinary portable engine can be used.

We have already, when reporting on Tasker's windlass, entered into the consideration of the advantages and disadvantages of driving by a strap. It is true that indiarubber, with canvas on it—such as is used by Mr. Hayes—will resist wet, but it is liable to tear or fret in the edges where it runs through the strap-fork; whilst leather is apt to get very soft, and to stretch in wet weather. The framework of the windlass is, as was previously stated, carried on four wheels, their axles being at right angles to the central shaft; therefore when the wheels sink into the ground they are well able to resist the side strain of the rope when winding, and do not require the fastenings usually applied to fix windlasses.

The drums are very small, the rope, therefore, has to endure a sharp curvature in winding on. Little or no attention is paid to the coiling, which is, consequently, badly done. We have previously alluded to the importance of regular coiling, as, if that be not obtained, the friction and wear on the rope are largely increased. When at work, both the engine and the windlass vibrate much more than in any other arrangement that came under our notice. There is, moreover, a complication about the windlass that is objectionable.

It will be seen from the preceding description that the power has to pass through a train of three wheels, and the short shaft carrying a pinion at each end, previously alluded to, which is thereby subjected to the whole strain of the apparatus, and is only provided with one central bearing, which, although rather long, is not capable of resisting the strain without very great wear.

The trial of this apparatus was not successful: partly from the absence of practical experience, the setting down of the tackle proved a most tedious business; when at length ready for work, the anchor at either end constantly dragged, and the cultivator could not get into the hard ground. The depth did not exceed 4 inches, and in many places the surface was merely scratched.

At last the stoppages were so numerous that the exhibitor discontinued the work.

Lot No. 6.—Fowler and Co.'s Double Drum Engine and Travelling Disc-anchor, having already been described, may be but briefly alluded to.

The work with a 6-tined cultivator was admirable, and confirmed and increased the favourable impression which the preliminary trial had given us. After reaching the field, 18½ minutes sufficed to get out all the tackle and start work.

As in the case of all Fowler's implements exhibited at Leicester, the transport was effected by the traction engines themselves without the aid of horses.

For the area cultivated, the time occupied in such cultivation, the weight of earth moved, &c., see the record already in Report of this engine in Class I.

Even more than in the case of the clip-drum does the price of this apparatus, 766*l.*, or with the implement 826*l.*, preclude it, in our judgment, from being eligible for a prize in Class II.

This completed the trials in Class II., which, it will be remembered, related to "The best application of steam power adapted for occupations of a moderate size."

The wording of the prize list being somewhat indefinite, we were left to decide what area constituted an "occupation of a moderate size." Referring to the voluminous Reports of the Inspection Committee, it appears that, with one or two exceptions, 250 to 300 acres of arable land was the smallest farm on which a set of steam cultivating machinery could be profitably employed without being occasionally let out to other farmers. We assume the smaller area of 250 acres as representing occupations of a "moderate size." With such

occupations as these the original cost of the apparatus becomes very important, and, in the consideration of this original cost, there of necessity must be weighed the power which the different ploughing systems possess of being worked from any ordinary portable or traction engine, because at the present day many small farms are already provided with such engines, and if they can be made available it is clear that the extra outlay for the mere apparatus required for cultivation is comparatively moderate, amounting only to about 250*l.* or something less. There was not exhibited at Leicester any direct system made up of a travelling anchor and a travelling windlass driven by an ordinary portable or traction engine; in the absence of any such arrangement, and considering all the points we have above alluded to, we are driven to the conclusion that the roundabout system which can be worked by an ordinary portable engine is the only one exhibited at Leicester which fulfils the conditions under which the prizes in Class II. are offered by the Society.

Whilst expressing this opinion (in explanation of the course we adopted) we must not be taken as saying that, in our judgment, the roundabout system, under all circumstances, is as good a system of applying steam cultivation as is the direct. On the contrary, we believe it might often be more to the advantage of farmers holding moderate occupations to combine to purchase a set of "direct acting tackle" rather than that each man should rely upon the roundabout system; or that it would be to the advantage of each owner to hire "direct steam tackle" from those persons who let it out. But, according to the instructions contained in the prize list, we were precluded from taking these questions into our consideration.

Bearing in mind the conditions as to the cost of the apparatus, which, in our reading, excludes Nos. 4 and 6 from being fit for "occupations of moderate size," we were unanimous in awarding the first prize of 50*l.* to No. 2, Messrs. J. and F. Howard, of Bedford; while the small amount of work done by No. 1, the indifferent character of the work of No. 3, and the small amount of it, and the withdrawal from the trial of No. 5, prevented our awarding the second prize to any of the competitors. (For tabulated statement see pp. 478-481).

Class III.

The Society wisely placed at the discretion of the Judges the sum of 100*l.* to be divided, as appeared desirable, among Ploughs, Cultivators, Harrows, Windlasses, &c.

The implements were tested, as at Newcastle, by the strain on the hauling rope, as indicated by the Newcastle dynamometer. A spring dynamometer was hung between the tail-rope and the implement, and thus the amount of back strain to be deducted from the gross strain was ascertained.

Messrs. Howard's Roundabout System was employed throughout to draw the implements of the various exhibitors. The qualities of the engine and tackle though severely tested, were successful under the test, as after the apparatus was once well set, the work proceeded without stoppage.

Ploughs for Steam Power.

The only competitors in this Class were Messrs. Fowler and Messrs. Howard.

The latter commenced with an enormous spring-balanced, double-acting. 2-furrow plough, for very deep work (1199), which, we understand, is principally intended for the foreign trade. Owing to the state of the ground, only one share and mould-board were employed at each end; a grand furrow, 12 to 13 inches deep by 17 inches wide was very well turned; three observations being taken.

Their 4-furrow Spring Balance Plough (1198) was not so successful. The depth of the furrow varied from 4 to 7 inches; this was probably due to bad

IMPLEMENT TRIALS AT

THE BEST APPLICATION OF STEAM POWER ADAPTED FOR OCCUPATIONS

Name of Exhibitor.	Number of Lot.	System.	Catalogue Number.	Engines, Implements, and Apparatus Employed.	Cost.	Observations.	Means of Transport.	Number of Men and Lads Engaged.
					£.			
Aveling and Porter.	1	Round-about.	5969	Patent Agricultural Locomotive, 10½ inch Cylinder, cost 420*l*.		4 Tines only at work.	The Traction-engine itself, and it drew a train of windlass implements and porters after it, and also the waggon.	Engine . . 1 Windlass . 1 Plough . . 1 Anchors . 2 Porters . . 2 — 7
,,	,,	,,	5967	Set of Steam Ploughing and Cultivating Apparatus, invented by J. Fowler of Leeds, and T. Aveling of Rochester, consisting of a Windlass, with 1600 yards of Steel-wire rope, 1 set of double Snatch-blocks, 4 single Snatch-blocks, Anchors, and Porters, 1 Fowler's Balanced 5-Tine Cultivator, 4 Tines at work, cost 250*l*.	670	Trial much delayed by changing points and drawing of anchors.		
,,	,,	,,	,,	If with 8 Patent Travelling Porters, in lieu of others, then extra	18			
Howard	2	Round-about.	1194	Portable Engine (10-Horse-power, by Clayton and Co.), cost 250*l*. . . .		4 Tines only at work.	8 horses.	Engine . . 1 Windlass . 1 Anchors . 2 Plough . . 1 Porters . . 2 — 7
,,	,,	,,	,,	Windlass with 1600 yards Steel-wire rope, pair of double Snatch-blocks, 4 single ditto, 8 Anchors, 10 lever Porters (No. 1207), cost 250*l*. . . .	500			
,,	,,	,,	,,	Patent double-action Steam-Cultivator, with 5 Tines (No. 1191)				
Tasker .	3	Round-about.	5516	Double Cylinder Traction Engine (by Clayton and Co.), cost 440*l*. . . .		Engine did its work at a very low pressure, which partly accounts for the poor results per nominal horse-power.	The Traction-engine itself and 2 horses.	Engine . . 1 Windlass . 1 Anchors . 2 Plough . . 1 Porters . . 2 — 7
,,	,,	,,	5517	Windlass and Double Snatch-block, 4 Snatch-blocks, 8 Anchors, 10 Porters, 1600 yards Steel-wire rope, Wrought Iron 5-Tine Single Acting Cultivator (Smith's), cost 196*l*.	636			

Leicester.—Class II.

of Moderate Size.—Tabular Statement of Systems Tried.

Time occupied in travelling from starting place to Trial Field.	Time occupied in getting ready to work after entering Trial Field.	Nominal Horse-power of Engine.	Time at Work.	Area Cultivated.	Area Cultivated per Day of 10 Hours.	Weight of Earth moved per Superficial Yard.	Depth of Earth moved.	Tons of Earth moved per Acre.	Tons of Earth moved per Hour.	Tons of Earth moved per nominal Horse-power at Work per Hour.	Nature and Condition of the Soil.	Quality of the Work.
Min.	Min.		H. M.	A. R. P.	A. R. P.	lbs.						
8	40	10-H.P.	2 49	1 1 17	4 3 10	453	6 5/16 inches.	978	470	47	Seeds pastured after Barley. Light land, but very dry and stony.	Good bottom.
6	58	10-H.P.	2 14	2 0 34	9 3 25	416	5 3/4 inches.	899	890	89	,,	Very good.
7	37	12-H.P.	3 23	2 0 8	6 0 9	318	4 3/8 inches.	687	416	34 1/2	,,	Inferior.

IMPLEMENT TRIALS AT

THE BEST APPLICATION OF STEAM POWER ADAPTED FOR OCCUPATIONS OF

Name of Exhibitor.	Number of Lot.	System.	Catalogue Number.	Engines, Implements, and Apparatus Employed.	Cost.	Observations.	Means of Transport.	Number of Men and Lads Engaged.
					£.			
Fowler .	4	Direct .	2485	Traction Engine with Clip Drum, 8½ inch Cylinder, 1 foot stroke, 800 yards of Wire Rope, 20 Rope Porters, and a 5-Disc Travelling Anchor, cost 648*l.*	708	In getting to work the rope was coupled up across by mistake, this caused the time in getting to work to be much longer than it would otherwise have been.	The Traction-engine itself.	Engine . . 1 Plough . . Anchor . . Porters . .
,,	,,	,,	2505	Balanced 5 Tine Cultivator, with Slack Gear, cost 60*l.*				
Hayes .	5	Round-about.	15	Portable Engine, 10½ inch Cylinder, cost 270*l.* . . .	550	The failure of the trial was partly due to the insufficient penetration of the anchors into the very hard ground.	Horses	..
,,		,,	16	Patent self-acting Windlass, cost 105*l.*				
,,		,,	17	A 3, and 5-Tined Cultivator combined, 6 Anchors, 6 Snatch-blocks, 20 Rollers, 3 Levers, 1400 yards Steel-wire rope, cost 175*l.*				
Fowler .	6	Direct .	2484	Traction Engine with Double Drum, 1200 yards Steel-wire rope, 20 Rope Porters, a 6-Disc patent Travelling Anchor, cost 766*l.*	826	..	The Traction-engine itself.	Engine . . Plough . Anchor . . Porters .
,,	,,	,,	,,	6-Tine Cultivator, cost 60*l.*				

Leicester.—Class II.

Moderate Size.—Tabular Statement of Systems Tried.—*continued.*

Time occupied in travelling from starting place to Trial Field.	Time occupied in getting ready to work after entering Trial Field.	Nominal Horse-power of Engine.	Time at Work.	Area Cultivated.	Area Cultivated per Day of 10 Hours.	Weight of Earth moved per Superficial Yard.	Depth of Earth moved.	Tons of Earth moved per Acre.	Tons of Earth moved per Hour.	Tons of Earth moved per nominal Horse-power at Work per Hour.	Nature and Condition of the Soil.	Quality of the Work.
Min.	Min.		H. M.	A. R. P.	A. A. P.	lbs.						
5¼	29	8-H.P.	1 49½	1 3 16	10 0 20	424	5¾ inches, calculated from the weight of soil moved.	916	928	116	,,	Very good.
..	..	10-H.P.	Did not finish.	..	..	182	2¼ inches, calculated from the weight of soil moved.	..	..	..	,,	Very bad.
7¼	18¾	10-H.P.	1 18	1 0 33	9 1 4	492	6¼ inches, calculated from the weight of soil moved.	1063	986	98½	,,	Very good.

setting, as we have seen very much better results with this implement. It, however, appears somewhat light for such very heavy work.

Fowler and Co. led off with a 3-furrow Balance Plough (2495) for deep work; only two sets of shares, &c., were used at each end of the implement, which made the furrows 12½ inches by 13 inches, leaving the same upright and well exposed to the air.

Fowler and Co.'s 4-furrowed Patent Balance Plough (2491), fitted with the long, straight, Kent breasts, made excellent work, leaving a regular surface that could be distinguished from that produced by any other implement. The particulars of draft will be seen by reference to the subjoined table.

Both Howard's and Fowler's Deep Ploughs are meritorious, and are occasionally valuable in England.

We awarded prize of 12*l.* to Fowler and Co.'s 4-furrow plough with Kent breasts (2491); highly commended Fowler and Co.'s 3-furrow deep plough (2495); and also highly commended J. and F. Howard's 2-furrow deep plough (1199).

Cultivators and Diggers.

The trial of these implements occupied a considerable time and excited much interest. Ploughing may occasionally be necessary, but the great bulk of steam-work will be disturbing and breaking without inverting, and the *cultivator* and digger to precede it when the surface is hard, are the implements most in vogue, and with which nearly everything can be accomplished.

Fowler and Co. exhibited their Bevel Beam 5-tine Cultivator (2505), first introduced at the Newcastle Meeting.

The difference between this implement and the digger is so slight that the work is nearly identical, the forked breasts of the latter possibly producing a rougher surface; but both operate in the same way as an ordinary plough, viz. by removing a portion of soil and passing it off to a loose side, and this should always distinguish between a real cultivator and a bastard implement like the digger, which figures under two characters.

The tines of the real cultivator force their passage through the soil by lifting, throwing the soil on either side, and riving it up indiscriminately; whereas the great bulk of soil disturbed by a digger, such as the tool in question, is thrown to the right of the implement. The implements are adapted for different operations: for autumn work, acting on a hard unmoved surface, we greatly prefer the digger, as making deeper work, leaving a better bottom if properly set, and throwing up the soil in a rougher condition, most suitable for atmospheric action. The work of the Bevel Beam Cultivator was decidedly superior.

Fowler and Co. next tried their large 7-tined Balance Cultivator (2498), working only 5 tines. This is a true cultivator, and more suitable to cross-land already smashed than to go into a hard soil. This is shown in the much smaller weight of soil moved per square yard. The bottom was ridgy and uneven; and the depth, as calculated from the weight, was 5 inches.

Fowler and Co.'s new Cultivator (2496), principally intended for light land, is really a novelty; and promises to be most valuable for double-engine work on large areas.

The width of implement is 7 feet 8 inches without the wings, which increase it to 12 feet; it carries a large number of tines, and consists of a strong frame on 3 wheels.

The tines are independent of the travelling frame, though carried on it when in work; by a lever action they can be lifted whilst the implement is turning. The position (in height) of the frame in reference to the wheels, and consequently the depth of the tines, is adjusted by a screw in front.

The engine travelling forward on the headland slews round the head of the

cultivator sufficiently far for the opposite engine to complete the turn. Considering the unfitness of the ground, the work was extremely good, sufficiently showing what might be accomplished under more favourable conditions. The steadiness of the implement was a point deserving of notice, contrasting with the jumping tendency of balance implements, steadied though they are by the rope-lever before referred to.

The cost of the cultivator is 75*l.*

The last implement in the class tried by Messrs. Fowler and Co. was their 4-furrow Digger; this was the plough-frame (2491) fitted with plough-share, &c., but with digging-breasts in place of ordinary mould-boards. The work was very deep and good, *vide* Table.

Messrs. Howard worked their 5-tined Reversible Cultivator with Rocking Tines (part of the set No. 1194) 4 tines only in work—a capital cultivator for small occupations. It is not capable of moving a great weight of soil; but what it does, is always well done. The regularity of the bottom, partly in consequence of the sole-plates, was noticeably good. The rapidity of reversing at the land's end is also great, and altogether we were favourably impressed with the work done. In very foul land, the distance between the under side of the frame and the ground is not sufficient to prevent choking up.

Messrs. Howard next worked the Plough-frame (1198) fitted as a Digger; but the depth moved was small, and the work done only indifferent.

Lastly, Messrs. Howard showed a large Cultivator (1192) suitable for light soils, capable of carrying 9 tines and moving a width of 7 feet 10 inches. The space between the wheels, however, is only 6 feet 10 inches, the extra foot being cultivated by tines removable at pleasure. The arrangement for deepening the tines was very inferior to that of Fowler's large implement. In light soils this cultivator of Howard's would doubtless prove a very useful tool.

The work at Leicester was very irregular; in some places it was out of the ground, at others it went in well, and, as will be seen, moved more soil than Fowler's implement of a similar kind.

Hayes and Tasker competed with Cultivators on W. Smith's principle (Hayes, 17; Tasker, 5518). We can only state that the work was inferior, the depth variable and never great, and the area moved small. Whatever may be the capabilities of these implements in soft soils, it was evident they were not fitted for the hardened surface at Leicester.

Our award was as follows:—	£
To (2496) Large Cultivator for light land—J. Fowler and Co.	15
„ (2498) Seven-tined Cultivator—J. Fowler and Co.	12
„ (1194) Five-tined Cultivator for moderate occupations—Messrs. Howard	12

Class of Harrows, Rollers, and Clodcrushers.

We were not able to subject the implements competing in this class to any dynamometrical tests. Even had time permitted such trials to be made, the extreme roughness of the surface would have greatly interfered with the obtaining of accurate results, neither were such tests necessary, since the excellence of these implements depends comparatively little on the draught they require, but very largely upon their efficiency; and working them over some deeply dug land gave us a very accurate notion of their merits.

Fowler's "Implement-frame" (2500), with its sensitive steerage, is a very useful application, carrying with equal facility harrows only, or harrows one-half, and a Croskill roller or Norwegian harrow; thus the surface can be crushed and harrowed at the same time, and a great area passed over in a day.

The harrows themselves jump more and are less efficient than those of Messrs. Howard (1203), which made excellent work.

DYNAMOMETER EXPERIMENTS,

Name of Exhibitor.	Catalogue Number.	Description of Implement.	Width taken by Implement. Ft.	In.	Number of Yards run whilst Dynamometer index in Gear. Yards.
J. & F. Howard	1199	Patent 2-Furrow Steam Plough, 1-Furrow in work	1	5⅜	104
Ditto	Ditto	Ditto ditto	1	5⅜	106
Ditto	Ditto	Ditto ditto	1	5⅜	116
J. Fowler & Co.	2495	3-Furrow Patent Balance French Plough, 2-Furrows in work ..	2	3½	81
Ditto	Ditto	Ditto ditto	2	3½	51
Ditto	2491	4-Furrow Patent Balance Plough, 4-Furrows in work	3	5	94
Ditto	Ditto	Ditto ditto	3	5	111
J. & F. Howard	1198	4-Furrow Steam Plough	3	9⅝	77
Ditto	Ditto	Ditto ditto	3	9⅝	112

DYNAMOMETER EXPERIMENTS,

Name of Exhibitor.	Catalogue Number.	Description of Implement.	Ft.	In.	Yards.
J. Fowler & Co.	2505	Patent Balance 5-Tined Cultivator, fitted as a Digger	4	1⅜	97
Ditto	Ditto	Ditto ditto	4	1⅜	101
Ditto	2498	7-Tined Patent Cultivator, 5 Tines in work	4	1	89
Ditto	Ditto	Ditto ditto	4	1	97
J. & F. Howard	1191	Patent double-action Steam Cultivator, 4 Tines in work	3	6¼	112
Ditto	Ditto	Ditto ditto	3	6¼	130
E. Hayes	17	1, 3, and 5-Tined Cultivator combined, 3 Tines in work	2	2¾	117
Ditto	Ditto	Ditto ditto	2	2¾	122
J. & F. Howard	1191	Patent double-action Steam Cultivator, fitted as Digger, 4 Tines	3	6½	83
Ditto	Ditto	Ditto ditto	3	6½	99
J. Fowler & Co.	2491	4-Furrow Plough, Tined as a Digger	3	5¾	95
Ditto	Ditto	Ditto ditto	3	5¾	99
Tasker & Son	5518	Wrought-iron Cultivator, 5 Tines in work	2	7½	91
Ditto	Ditto	Ditto ditto	2	7½	104
J. Fowler & Co.	2498	7-Tined Cultivator	6	1¾	102
Ditto	Ditto	Ditto ditto	6	1¾	125
J. & F. Howard	1192	Steam Cultivator, 9 Tines	7	0½	124

STEAM PLOUGHS.

Time occupied in the Run.	Total draft in lbs., including the strain put on by the Tail-rope.	Strain (approximate) of the Tail-rope.	Net draft (approximate) in lbs. to draw the Implement, exclusive of the strain of the Tail-rope.	Weight of Earth moved per Superficial Yard.	Weight of Earth moved per Acre.	Depth of Earth moved.	Time required to Cultivate an Acre, assuming the Implement to go continuously on without stopping or turning.
′ ″	Lbs.	Lbs.	Lbs.	Lbs.	Tons.	Inches.	H. M.
2 0	1824	532	1292	990	2140	$12\frac{5}{16}$	3 11
2 0	2115	532	1583	990	2140	$12\frac{5}{16}$	3 9
2 0	2392	532	1860	990	2140	$12\frac{5}{16}$	2 53
1 30	3527	616	2911	1009	2180	$12\frac{1}{2}$	1 57
1 0	4365	616	3749	1009	2180	$12\frac{1}{2}$	2 4
2 0	3901	672	3229	581	1255	$7\frac{11}{16}$	1 30
1 50	3696	672	3024	581	1255	$7\frac{11}{16}$	1 10
1 30	2378	828	1550	539	1165	$7\frac{3}{16}$	1 13
2 0	2953	560	2393	539	1165	$7\frac{3}{16}$	1 8

STEAM CULTIVATORS AND DIGGERS.

2 0	3880	560	3320	448	968	$6\frac{1}{8}$	1 12
2 0	3864	580	3284	448	968	$6\frac{1}{8}$	1 10
1 50	3795	616	3179	364	786	5	1 12
2 0	3828	616	3212	364	786	5	1 13
2 0	3231	728	2503	464	1003	$6\frac{1}{4}$	1 13
2 0	3082	738	2344	464	1003	$6\frac{1}{4}$	1 3
2 0	1665	616	1049	415	896	$5\frac{11}{16}$	1 51
2 0	1705	616	1089	415	896	$5\frac{11}{16}$	1 46
2 0	..	616	..	382	825	$5\frac{1}{4}$	1 38
2 0	3584	672	2912	382	825	$5\frac{1}{4}$	1 22
2 0	4016	728	3288	748	1617	$9\frac{3}{8}$	1 28
2 0	3672	728	2944	748	1617	$9\frac{3}{8}$	1 23
1 30	2517	560	1957	311	673	$4\frac{3}{8}$	1 30
2 0	2851	532	2319	311	673	$4\frac{3}{8}$	1 46
2 0	2813	504	2309	241	520	$3\frac{7}{16}$	0 46
2 0	3880	644	3236	241	520	$3\frac{7}{16}$	0 38
2 0	3818	728	3090	366	790	$5\frac{1}{16}$	0 33

Messrs. Amies and Barford exhibited two Ribbed Rollers, one to turn round at the end, the other to be drawn backwards and forwards. The steerage of the former was too light, and soon broke; the other worked better, but the leverage for guiding was insufficient.

We awarded as follows:—

	£
To (2500) Fowler and Co.'s Frame for various Implements	8
„ (1203) Howard's Harrows	7

We awarded Messrs. Fowler the prize of 10*l.* for their Travelling Disc Anchor, which for ingenuity, simplicity, and efficiency still stands far ahead of every competitor.

Windlasses and Application of Power thereto.

At Newcastle the Windlasses were subjected to a dynamometrical test, in order to ascertain the absolute friction in transmitting the power through them —a test which the Judges on that occasion were enabled to carry out satisfactorily in consequence of the beautifully uniform plastic condition of the soil, which afforded a regular steady resistance to the implement being drawn by the windlass under trial. It was sought to repeat these experiments at Leicester, but after a very considerable time had been expended in endeavouring to make the best arrangements, it was found to be absolutely impossible to obtain a steady resistance without resorting to expedients which the time then at our disposal did not admit of our employing. The friction-tests, therefore, of the windlasses had to be abandoned. We however had no difficulty in coming to a decision as to the merits of the windlasses—that is, the hauling implements; and we awarded prizes as under to the Clip Drum of Fowler (2485), which utilises in aid of the traction the strain of the tail-rope; to the Double Drum of Fowler (2484), which is applicable to work either with the travelling anchor or with the roundabout system, and which has such excellent self-acting coiling-gear; and to the Windlass used by Howard with his roundabout system (1194).

		£
2485.	Fowler's Clip Drum Windlass	8
2484.	Fowler's Double Drum Windlass	8
1194.	Messrs. J. and F. Howard's Windlass	8

It now remains to revert to the fact that his Highness the Viceroy of Egypt as a memento of his visit to the Bury Meeting, and as an evidence of the great interest he takes in the question of steam-culture, offered through the Society a magnificent piece of plate, "as a Prize for the best Implement to be driven by Steam Power, combining strength with simplicity of construction and suitable for foreign countries where repairs are difficult to execute."

The Prize valued at 200*l.* consisted of a massive silver-gilt vase (having a suitable inscription), and a set of handsome goblets.

This Prize we awarded to the firm of John Fowler and Co., as we consider their machinery as exhibited most suitable for foreign countries where repairs are difficult to execute.

We cannot conclude our report without bearing grateful testimony to the attention and ability of the Field Stewards, Messrs. Elphick and Smith, and the great value of the assistance they rendered us. The experience of the former, dating from the Chester meeting in 1858, and added to year by year, renders him peculiarly valuable in facilitating the various arrangements required, but which the Judges, without such assistance, could not hope to carry out. It has been our pleasant duty on previous occasions to tender our sincere thanks to the Stewards of Implements for their assistance, and for their anxious care to forward the work and to bring matters to a satisfactory conclusion; but

never were such thanks more deserved than on the present occasion. It was quite evident that the gentlemen in office considered their position as no sinecure, but as one involving grave responsibilities, which they ably discharged. To Mr. Amos, the Society's Engineer, and to his son, Mr. J. Amos, who cooperated with him, we are also much indebted for cordial assistance on all occasions. To Exhibitors and to their agents we offer our thanks for their courtesy and willingness to oblige: this was very marked throughout. If there were a tendency on one or two occasions to be somewhat obtrusive, and to become suggestive, it was easily accounted for by the extreme anxiety on the part of agents for the interests of their employers. We may be allowed to confirm a suggestion made in the Newcastle Report respecting the trials of implements for steam-power, viz., that they shall be arranged to take place at the earlier part of the time before the public crowd upon the Judges and considerably hinder the work. It would also be desirable to limit the attendance upon each implement to the maker or agent, and the workmen, and to keep every one else outside the ropes. The public can learn little or nothing whilst the dynamometrical tests are in progress, and the work is much expedited when the course is clear.

We think the Royal Agricultural Society may fairly congratulate itself on having largely assisted in establishing steam-culture in this country, and by its example in several foreign countries, to the great and lasting benefit of mankind; for it is greatly owing to the course followed by the Society in trying and proving all machines that in any way promise a chance of success in any branch of agriculture, that the breaking down of old prejudices and the early distribution of the knowledge of practical facts is due; and the enlightened advocacy by the Society of all sound improvements in agricultural machinery has greatly encouraged implement-makers and inventors to persevere with every good and promising scheme, as they have felt that although they might expect no favour, they were at all times certain of a fair field. Thus the steady promotion of improvements has undoubtedly been secured in the safest manner.

The special means adopted in the appointment of Inspection Committees for the purpose of sifting statements and accumulating facts specially affecting steam-cultivation, and the placing them prominently before agriculturists (who might in many cases have some difficulty in collecting and comparing statements for themselves) has greatly tended to promote sound views on the subject, and thereby necessarily to extend the application of machinery of the best kinds, and thus enable all to reap the benefits to be derived from the practical application of modern science and practice.

It is now a fact, and we trust that this Report may have some practical effect in making it known through the length and breadth of the land, that a farmer (or small club of farmers) may at an outlay of 1284*l.* become possessed of the most improved direct tackle, capable of conveying itself to the field to be ploughed or cultivated, and in *three minutes* from the moment of its arrival may be ploughing or cultivating at such speed as will complete a field of nine or ten acres in ten hours; or should such outlay be considered too great in certain cases, then nearly the same rate of cultivation may be attained with another set of direct tackle, costing 708*l.*, though in this case some time would be lost in fixing the tackle; or if a farmer has only a small farm of say 250 acres, and possesses a common portable engine, he may for an outlay of 250*l.*, equal to a pound per acre, acquire a set of roundabout tackle that will enable him with his engine to cultivate at a somewhat less rate than above named, though he would in this case have to use his horses to take the engine and tackle to their place, in the same way that he would have to do if required to take the engine and thrashing-machine to a stack of wheat to thrash.

As this country has ever taken the lead in developing manufactures and

commerce, and as it has also constantly led the van in adopting every species of mechanism calculated in any way to help the farmer in producing the fruits of the earth in the greatest perfection and abundance, so the Royal Agricultural Society may fairly claim to have been foremost in promoting in every way possible the practical application of all real improvement; and we feel that we may safely state our opinion to be, that in no one direction have the exertions of the Society been more successful than in the promotion of steam-cultivation of the soil.

F. J. Bramwell,
E. A. Cowper,
John Coleman,
John Hemsley,
John Rooke.

September 11*th*, 1868.

END OF VOL. IV.—SECOND SERIES.

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President.

THE DUKE OF RICHMOND, K.G.

Trustees.

ACLAND, Sir THOMAS DYKE, Bart., *Killerton Park, Exeter, Devonshire.*
BERNERS, Lord, *Keythorpe Hall, Leicester.*
BRAMSTON, THOMAS WILLIAM, *Skreens, Chelmsford, Essex.*
CHALLONER, Colonel, *Portnall Park, Staines, Middlesex.*
CHESHAM, Lord, *Latimer, Chesham, Bucks.*
MARLBOROUGH, Duke of, *Blenheim Park, Oxford.*
PORTMAN, Lord, *Bryanston, Blandford, Dorset.*
POWIS, Earl of, *Powis Castle, Welshpool, Montgomeryshire.*
RUTLAND, Duke of, K.G., *Belvoir Castle, Grantham, Leicestershire.*
SPEAKER, The Rt. Hon. the, *Ossington, Newark-on-Trent, Notts.*
THOMPSON, HARRY STEPHEN, *Kirby Hall, York.*
TREDEGAR, Lord, *Tredegar Park, Newport, Monmouthshire.*

Vice-Presidents.

BRIDPORT, Lord, *Cumberland Lodge, Windsor, Berkshire.*
CATHCART, Earl, *Thornton-le-Street, Thirsk, Yorkshire.*
CHICHESTER, Earl of, *Stanmer Park, Lewes, Sussex.*
DOWNSHIRE, Marquis of, *East Hampstead Park, Bracknell, Berkshire.*
EGMONT, Earl of, *Cowdray Park, Petworth, Sussex.*
EVERSLEY, Viscount, *Heckfield Place, Winchfield, Hants.*
HILL, Viscount, *Hawkstone Park, Salop.*
JOHNSTONE, Sir JOHN V. B., Bart., M.P., *Hackness Hall, Scarborough, Yorkshire.*
JONAS, SAMUEL, *Chrishall Grange, Saffron Walden, Essex.*
KERRISON, Sir EDWARD C., Bart., *Brome Hall, Scole, Suffolk.*
MILES, Sir WILLIAM, Bart., *Leigh Court, Bristol, Somersetshire.*
WALSINGHAM, Lord, *Merton Hall, Thetford, Norfolk.*

Other Members of Council.

ACLAND, THOMAS DYKE, M.P., *Sprydoncote, Exeter, Devonshire.*
AMOS, CHARLES EDWARDS, 5, *Cedars Road, Clapham Common, Surrey.*
BALDWIN, JOHN, *Luddington, Stratford-on-Avon, Warwickshire.*
BARNETT, CHARLES, *Stratton Park, Biggleswade, Bedfordshire.*
BARTHROPP, NATHANIEL GEORGE, *Hacheston, Wickham Market, Suffolk.*
BOWLY, EDWARD, *Siddington House, Cirencester.*
CANTRELL, CHARLES S., *Riding Court, Datchet, Bucks.*
CLAYDEN, JOHN, *Littlebury, Saffron Walden, Essex.*
CLIVE, GEORGE, M.P., *Perrystone, Ross, Herefordshire.*

Davies, David Reynolds, *Mere Old Hall, Knutsford, Cheshire.*
Dent, J. D., M.P., *Ribston Hall, Wetherby, Yorkshire.*
Devonshire, Duke of, K.G., *Holker Hall, Lancashire.*
Druce, Joseph, *Eynsham, Oxford.*
Edmonds, William John, *Southrop, Lechlade, Gloucestershire.*
Gibbs, B. T. Brandreth, *Halfmoon Street, Piccadilly, London,* W.
Hassall, William, *Bubney, Whitchurch, Salop.*
Holland, Edward, M.P., *Dumbleton Hall, Evesham, Gloucestershire.*
Hornsby, Richard, *Spittle Gate, Grantham, Lincolnshire.*
Hoskyns, Chandos Wren, *Harewood, Ross, Herefordshire.*
Hutton, William, *Gate Burton, Gainsboro', Lincolnshire.*
Kingscote, Colonel, M.P., *Kingscote, Wootton-under-Edge, Gloucestershire.*
Lawes, John Bennet, *Rothamsted, St. Albans, Herts.*
Liddell, Hon. Henry George, M.P., *Ravensworth Castle, Durham.*
Lopes, Sir Massey, Bart., M.P., *Maristow, Roborough, Devon.*
Macdonald, Sir Archibald Keppel, Bart., *Woolmer Lodge, Liphook, Hants.*
Milward, Richard, *Thurgarton Priory, Southwell, Notts.*
Pain, Thomas, *Ugford Cottage, Salisbury, Wilts.*
Randell, Charles, *Chadbury, Evesham, Worcestershire.*
Ransome, Robert Charles, *Ipswich, Suffolk.*
Read, Clare Sewell, M.P. *Honingham Thorpe, Norwich.*
Richmond, Duke of, K.G., *Goodwood, Chichester, Sussex.*
Rigden, William, *Hove, Brighton, Sussex.*
Sanday, William, *Holmepierrepont, Notts.*
Shrewsbury and Talbot, Earl of, *Ingestre Hall, Staffordshire.*
Shuttleworth, Joseph, *Hartsholme Hall, Lincoln.*
Smith, Robert, *Emmett's Grange, Southmolton, Devon.*
Stone, N. Chamberlain, *Aylestone Hall, Leicester.*
Torr, William, *Aylesby Manor, Great Grimsby, Lincolnshire.*
Trollope, The Right Hon. Sir John, Bart., M.P., *Caswick, Stamford, Lincolnshire.*
Turner, George, *Brampford Speke, Exeter, Devonshire.*
Vane, Sir Henry Ralph, Bart., *Hutton Hall, Penrith, Cumberland.*
Vernon, Lord, *Sudbury Hall, Derby.*
Wallis, Owen, *Overstone Grange, Northampton.*
Wells, William, *Holmewood, Peterborough, Northamptonshire.*
Western, Sir Thomas B., Bart., M.P., *Felix Hall, Kelvedon, Essex.*
Webb, James, *Spring Hill, Fladbury, Pershore, Worcestershire.*
Wilson, Major Fuller Maitland, *Stowlangtoft Hall, Bury St. Edmund's, Suffolk.*
Wilson, Jacob, *Woodhorn Manor, Morpeth, Northumberland.*
Wilson, Professor, *Iver, Uxbridge, Bucks.*
Wynn, Sir Watkin Williams, Bart, M.P., *Wynnstay, Rhuabon, Denbighshire.*

Secretary.

H. HALL DARE, 12, *Hanover Square, London,* W.

Editor—P. H. Frere, *Paston House, Cambridge.*
Consulting-Chemist—Dr. Augustus Voelcker, 11, *Salisbury Square,* E.C.
Veterinary-Inspector—James Beart Simonds, *Royal Veterinary College,* N.W.
Consulting Engineer—James Easton, or C. E. Amos, *Grove, Southwark,* S.E.
Seedsmen—Thomas Gibbs and Co., *Corner of Halfmoon Street, Piccadilly,* W.
Publisher—John Murray, 50, *Albemarle Street,* W.
Bankers—The London and Westminster Bank, *St. James's Square Branch,* S.W.

STANDING COMMITTEES FOR 1868.

Finance Committee.

BRIDPORT, Lord, Chairman.
BARNETT, CHARLES.
BRAMSTON, T. W.
KINGSCOTE, Colonel, M.P.
RANDELL, CHARLES.
TORR, WILLIAM.

House Committee.

THE PRESIDENT.
CHAIRMAN of Finance Committee.
CHESHAM, Lord.
BRAMSTON, T. W.
CHALLONER, Colonel.
GIBBS, B. T. BRANDRETH.
TORR, WILLIAM.

Journal Committee.

THOMPSON, H. S., Chairman.
CATHCART, Earl, Vice-Chairman.
SPEAKER, The Rt. Hon. the.
JOHNSTONE, Sir J. V. B., Bt., M.P.
KERRISON, Sir E. C., Bt.
ACLAND, T. DYKE, M.P.
DENT, J. D., M.P.
HOLLAND, ED., M.P.
HOSKYNS, C. WREN.
MILWARD, RICHARD.
WALLIS, OWEN.
WILSON, JACOB.

Chemical Committee.

LAWES, J. B., Chairman.
CATHCART, Earl.
VERNON, Lord.
JOHNSTONE, Sir J. V. B., Bt., M.P.
KERRISON, Sir E. C., Bt.
LOPES, Sir MASSEY, Bt., M.P.
VANE, Sir H., Bt.
DAVIES, D. R.
DENT, J. D., M.P.
HOLLAND, ED., M.P.
HOSKYNS, C. WREN.
HUXTABLE, Ven. Archdeacon.
THOMPSON, H. S.
WELLS, WILLIAM.
WILSON, JACOB.

Veterinary Committee.

BRIDPORT, Lord, Chairman.
LIDDELL, Hon. H., M.P.
JOHNSTONE, Sir J. V. B., Bt., M.P.
VANE, Sir H., Bt.
CHALLONER, Colonel.
DENT, J. D., M.P.
GIBBS, B. T. BRANDRETH.
PAIN, THOS.
SIMONDS, Professor.
SPOONER, Professor.
VARNELL, Professor.
WELLS, WILLIAM.
WILSON, JACOB.

Stock-Prizes Committee.

BRIDPORT, Lord.
CHESHAM, Lord.
WALSINGHAM, Lord.
LIDDELL, Hon. H. G., M.P.
TROLLOPE, Sir JOHN, Bt., M.P.
BALDWIN, JOHN.
BARNETT, CHARLES.
BARTHROPP, NATHANIEL G.
BOWLY, EDWARD.
CLAYDEN, JOHN.
DAVIES, D. R.
DENT, J. D., M.P.
DRUCE, JOSEPH.
GIBBS, B. T. BRANDRETH.
HASSALL, WM.
HOLLAND, ED., M.P.
JONAS, SAMUEL.
MILWARD, RICHARD.
RANDELL, CHAS.
RIGDEN, WM.
SANDAY, WM.
SMITH, ROBERT.
TORR, WILLIAM.
TURNER, GEORGE.
WALLIS, OWEN.
WEBB, JAMES.
WILSON, JACOB.
The Stewards of Live Stock.

Implement Committee.

CHALLONER, Col., Chairman.
CATHCART, Earl.
BRIDPORT, Viscount.
VERNON, Lord.
KERRISON, Sir E. C., Bt.
MACDONALD, Sir A. K., Bt.
AMOS, C. E.
CANTRELL, CHAS. S.
DRUCE, JOSEPH.
GIBBS, B. T. BRANDRETH.
HOLLAND, ED., M.P.
HORNSBY, RICHARD.
HOSKYNS, C. WREN.
RANDELL, CHARLES.
READ, C. S., M.P.
SANDAY, WILLIAM.
SHUTTLEWORTH, JOSEPH.
THOMPSON, H. S.
TORR, WILLIAM.
WALLIS, OWEN.
WILSON, Professor.
WILSON, JACOB.
The Stewards of Implements.

General Manchester Committee.

RICHMOND, Duke of, Chairman.
RUTLAND, Duke of.
POWIS, Earl of.
BRIDPORT, Viscount
CHESHAM, Lord.
KESTEVEN, Lord.
PORTMAN, Lord.
TREDEGAR, Lord.
VERNON, Lord.
WALSINGHAM, Lord.
LIDDELL, Hon. H. G., M.P.
Sir E. C. KERRISON, Bt.
WYNN, Sir W. WILLIAMS, Bt., M.P.
AMOS, C. E.
BARNETT, CHARLES.
BOWLY, EDWARD.
CANTRELL, CHARLES S.
CHALLONER, Colonel.
CLAYDEN, JOHN.
DAVIES, D. R.
DENT, J. D., M.P.
GIBBS, B. T. BRANDRETH.
HOLLAND, E., M.P.
HORNSBY, RICHARD.
HOSKYNS, C. WREN.
MANCHESTER, The Mayor of.
MILWARD, RICHARD.
PAIN, THOMAS.
RANDELL, CHARLES.
RANSOME, R. C.
READ, C. S., M.P.
SANDAY, WILLIAM.
SHUTTLEWORTH, JOSEPH.
STONE, N. C.
THOMPSON, H. S.,
TORR, WILLIAM.
VANE, Sir H. R., Bt.
WEBB, JAMES.
WELLS, WILLIAM.
WILSON, Major.
WILSON, JACOB.
The Stewards.

Show-Yard Contracts Committee.

RANDELL, CHARLES, Chairman.
CATHCART, Earl.
BRIDPORT, Viscount.
VERNON, Lord.
AMOS, C. E.
GIBBS, B. T. BRANDRETH.
HORNSBY, RICHARD.
MILWARD, RICHARD.
SANDAY, WILLIAM.
SHUTTLEWORTH, JOSEPH.
THOMPSON, H. S.
TORR, WILLIAM.

Committee of Selection.

CATHCART, Earl.
POWIS, Earl of.
BRIDPORT, Viscount.
WALSINGHAM, Lord.
SPEAKER, Right Hon. the.
JOHNSTONE, Sir J. V. B., Bart., M.P.
CLAYDEN, JOHN.
DENT, J. D., M.P.
DRUCE, JOSEPH.
HOLLAND, E., M.P.
MILWARD, R.
RANDELL, CHARLES.
THOMPSON, H. S.
TORR, WILLIAM.
WALLIS, OWEN.
WELLS WILLIAM.

Education Committee.

POWIS, Earl of.
BRIDPORT, Viscount.
ACLAND, T. DYKE, M.P.
DENT, J. D., M.P.
HOLLAND, E., M.P.
HOSKYNS, C. WREN.
KINGSCOTE, Col., M.P.
WELLS, W.
WILSON, PROFESSOR.
VOELCKER, Dr.

Cattle Plague Committee.

THE WHOLE COUNCIL.

*** The PRESIDENT, TRUSTEES, and VICE-PRESIDENTS are Members *ex officio* of all Committees.

Royal Agricultural Society of England.

GENERAL MEETING,

12, Hanover Square, Wednesday, May 22, 1868.

REPORT OF THE COUNCIL.

Since the last General Meeting in December, 4 governors and 42 members have died, the names of 189 members have been removed from the list, 139 members have been elected, so that the Society now consists of

75 Life Governors,
74 Annual Governors,
1409 Life Members,
3888 Annual Members,
15 Honorary Members,

making a total of 5461, being a decrease of 97 names.

It is with great regret the Council have to announce the death, on the 12th instant, of Mr. P. H. Frere, the highly respected and talented Editor of the 'Journal.'

While the expenditure of the Society is yearly increasing from the greater extent of its prizes, and the costly nature of the prolonged and scientific trials which are required for implements, the Council regret to observe this diminution in the number of members, and they are driven to the necessity of asking whether, if the Society is fulfilling the objects for which it was instituted, it receives the support which it deserves. In promoting the improvement of the breeds of stock, in testing the quality and usefulness of the implements required for the cultivation of the soil, in making detailed inquiry into the relations of science with agriculture through the researches of practical and professional men, and in spreading information by means of their Journal, their efforts have been continuous—and on the whole,

they believe, successful. More recently they have endeavoured by direct action to encourage the education of agriculturists; and though this question has provoked much difference of opinion both in the Council and amongst other members of the Society, it is one which, having been attempted, the Council would regret hastily to abandon. The Council are anxious in all these matters to progress, and to carry out the objects for which the Society was incorporated with vigour and completeness; but to do this requires the active sympathy and aid of the Landowners and Tenant Farmers of the country, which can only be obtained by an addition to the number of subscribing members of the Society.

The Council have elected Mr. William John Edmonds, of Southrop, Lechlade, Gloucestershire, to be a Member of Council in the room of Mr. Lawrence, resigned; and Mr. Robert Charles Ransome, of Bolton Hill, Ipswich, in the room of Mr. Hudson, resigned.

The half-yearly statement of accounts to the 31st December, 1867, has been examined and approved by the auditors and accountants of the Society, and, together with a balance-sheet for the whole year, 1867, and a statement of the Country Meeting account for Bury St. Edmund's, has been published in the last number of the 'Journal.' The funded capital stands at 16,027*l.* 19*s.* 7*d.* in the New Three per Cents., the sum of 2000*l.* remains on deposit with the Society's bankers, and the cash balance in their hands on the 1st instant was 3243*l.* 11*s.*

The Leicester Meeting to be held from the 16th to the 22nd July promises to exceed that of Bury St. Edmund's in the Implement Department. The entries of Horses, Cattle, Sheep, Pigs, Cheese, Butter, and Wool, will remain open as usual till the 1st of June. In order to enable a larger number of the Members to attend the General Meeting of the Society held annually during the Country Meeting, the Council has determined that it be held on the Saturday in the week of the Show.

After careful consideration the Council have resolved—

(1.) That in order to reduce the number of implements to be tried at each Show so as to afford time for thorough testing, it is desirable that a further subdivision in the classes should be made; and have adopted the following classification of Implements for trial :—

1869.—*Machines and Implements for the Harvesting of Crops: viz.*—Mowing machines, reaping ditto, hay-making ditto, hay collectors, horse rakes, carts and waggons, liquid-manure carts.

1870.—*Fixed Engines worked by Steam and other Power, and Machines for the preparation of Food for Stock: viz.*—Fixed engines, chaff cutters, cake breakers, corn crushers, corn mills, linseed mills, turnip cutters, root pulpers, steaming apparatus, dairy implements, bone mills, guano breakers, coprolite mills, tile machinery, draining tools, flax-breaking machines, horse gears.

1871.—*Machines for the Cultivation of the Land by Steam-power and Traction-engines.*

1872.—*Portable Steam Engines and Machines and Implements for the preparation of Crops for Market: viz.*—Portable steam engines, thrashing machines, straw elevators, seed shellers, corn-dressing machines, corn screens, barley hummellers, corn-drying machines.

1873.—*Machines and Implements for the Tillage of Land by Horse-power: viz.*—Ploughs, harrows, rollers, clod-crushers, cultivators and scarifiers, digging machines, potato diggers, drills, horse-hoes, and manure distributors.

(2.) That it be considered an invariable rule that the trial of each class of implements shall take place under the superintendence of three judges.

(3.) That the prize-list and all the conditions connected with the exhibition and trial of implements shall be published at least twelve months beforehand, and, if practicable, not later than the 1st of July in the year preceding each Show.

(4.) That the trials shall commence sufficiently early for them all to be concluded, and the awards made known, before the opening of the Show to the public.

(5.) That at Leicester the trials of tillage implements worked by horse-power shall commence on Thursday, the 9th of July; and all such implements, if intended for trial, must be delivered in the Show-yard not later than Tuesday, the 7th of July.

(6.) That a preliminary trial of machinery for the cultivation

of the land by steam shall take place at Leicester, and a selection of machines then be made, for further trial after harvest.

Mr. Larking, the representative in England of the Viceroy of Egypt, having expressed to the Society the great interest taken by his Highness in promoting the science of Agriculture, and also the pleasure derived from a visit to their Show-yard at Bury St. Edmund's during his short stay in this country, announced the anxiety of his Highness to offer a Prize Cup to be awarded by the Society at their next show of agricultural implements, and the Council have resolved on accepting the offer of his Highness the Viceroy of Egypt, of a prize "for the best implement for the cultivation of the soil by steam-power, combining strength with simplicity of construction, for use in foreign countries, where skilled labour for repairs is difficult to be procured." This Cup, which is of the value of about 150*l.*, will be competed for at the Leicester Meeting, and finally awarded at the adjourned trial after harvest.

The examinations of Candidates for the Society's honours and prizes in connexion with Education have recently taken place in the Society's house, where twelve candidates presented themselves out of eighteen who had entered, and in the opinion of the examiners the competition has been superior in its kind to that on former occasions. The terms approved of by the Council required that every candidate should satisfy the Examiners in the following subjects—viz.: In the Science and Practice of Agriculture and in Bookkeeping, as well as in Land Surveying, or in Mechanics as applied to Agriculture; consequently to pass in *Bookkeeping* was essential to success. In this subject, however, no one candidate has succeeded in obtaining even the minimum number of marks fixed by the examiners, who report as follows:—

> "To entitle a candidate to a first-class certificate he must obtain 75 out of the 100 marks allotted to this subject—to a lower class 30 marks. We have been unable to apportion the lowest minimum (30) to any one candidate, consequently they all come under the category 'not passed.'"

The result is that no classification has been made, nor have any certificates been granted. The following prizes have, how-

ever, been awarded to the undernamed candidates* as having shown respectively the highest merit in each subject named:—

		£.	s.	d.
Science and Practice of Agriculture ..	S. H. Walton	10	0	0
Mechanics	T. J. Elliot	10	0	0
Chemistry	G. K. Walton	10	0	0
Botany	R. G. Scriven	5	0	0
	T. J. Elliot	5	0	0
Geology	R. G. Scriven	5	0	0
Veterinary Science	R. Bryden	5	0	0
Land Surveying	J. Harle	5	0	0

The Council have determined that the Annual Country Meeting in 1869 shall be held at Manchester, subject to the usual conditions.

The district for the Country Meeting of 1870 will include the counties of Berkshire, Buckinghamshire, Hampshire, Kent, Middlesex, Oxfordshire, Surrey, and Sussex.

By Order of the Council,

H. Hall Dare,

Secretary.

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* For the Examination Papers, see p. lxx *infra*.

DR. HALF-YEARLY CASH ACCOUNT

					£.	s.	d.	£.	s.	d.
To Balance in hand, 1st January, 1868:—										
Bankers					329	16	4			
Secretary					19	17	2			
								349	13	6
To Income:—										
Dividends on Stock					234	8	2			
Subscriptions:—	£.	s.	d.							
Governors' Annual	380	0	0							
Members' Life-Compositions ..	350	0	0							
Members' Annual	3,029	7	0							
					3,759	7	0			
Journal:—										
Advertisements					16	3	6			
								4,009	18	8
To Country Meetings:—										
Bury St. Edmund's Meeting					8	4	0			
Leicester					4,049	10	6			
								4,057	14	6
								£8,417	6	8

BALANCE-SHEET,

LIABILITIES.					£.	s.	d.	£.	s.	d.
To Capital:—										
Surplus, 31st December, 1867					20,591	7	9			
Surplus of Income over Expenditure during the Half-year, viz.:—	£.	s.	d.							
Income	4,009	18	8							
Expenditure	2,440	7	10							
					1,569	10	10			
					22,160	18	7			
To Bury St. Edmund's Meeting:—										
Difference between Receipts and Expenditure, the latter exceeding the former by					183	5	6			
								£21,977	13	1

BRIDPORT, *Chairman of Finance Committee.*
QUILTER, BALL, & Co., *Accountants.*

FROM 1ST JANUARY TO 30TH JUNE, 1868. CR.

	£.	s.	d.	£.	s.	d.	£.	s.	d.
By Expenditure:—									
Establishment—									
Official Salaries and Wages	344	18	0						
House Expenses, Rent, Taxes, &c.	356	1	10						
				700	19	10			
Journal:—									
Printing	411	2	0						
Postage and Delivery	109	0	0						
Advertising	6	18	6						
Stitching	78	0	8						
Prize Essays	35	0	0						
Other Contributions	107	11	6						
Wrappers for 3 parts	27	0	0						
Editor's Salary	250	0	0						
				1,024	12	8			
Chemical:—									
Consulting Chemist's Salary ..	150	0	0						
Grant for Investigations	200	0	0						
				350	0	0			
Veterinary:—									
Professor Ernes for Report on Veterinary Congress at Vienna	10	0	0						
Grant to Royal Veterinary College (half-year)	100	0	0						
				110	0	0			
Education				211	13	0			
Postage and Carriage				33	11	10			
Advertisements				3	7	6			
Subscriptions paid in error, returned				6	3	0			
							2,440	7	10
By Country Meetings:—									
Bury St. Edmund's				191	9	6			
Leicester				2,448	16	4			
							2,640	5	10
By Deposit Account with London and Westminster Bank				..		..	2,000	0	0
By Balance in hand, 30th June, 1868:—									
Bankers				1,320	9	9			
Secretary				16	3	3			
							1,336	13	0
							£8,417	6	8

30TH JUNE, 1868.

ASSETS.	£.	s.	d.	£.	s.	d.
By Cash in hand	1,336	13	0			
By Deposit Account	2,000	0	0			
By New 3 per Cent. Stock 16,027*l.* 19*s.* 6*d.* cost*	15,379	15	7			
By Books and Furniture in Society's House	2,000	0	0			
By Country Meeting Plant	2,800	0	0			
				23,516	8	7
Less at Credit of Leicester Meeting				1,538	15	6
				£21,977	13	1

* *Value at* 95=£15,226 11*s.* 6*d.*

Mem.—The above Assets are exclusive of the amount recoverable in respect of arrears of Subscription to 30th June, 1868, which at that date, including those of the current year, amounted to 1594*l.*

Examined, audited, and found correct, this 4th day of August, 1868.

FRANCIS SHERBORN, *Auditor.*

SHOW AT LEICESTER,

JULY, 1868.

STEWARDS OF THE YARD.

Stock.
Edward Bowly,
William Wells,
David Reynolds Davies,

Implements.
William Sanday,
William Torr,
Sir A. K. Macdonald, Bart.

Forage.
William Sanday.

Honorary Director of the Show.
B. T. Brandreth Gibbs.

JUDGES OF STOCK.

Thoroughbreds, Hunters, Hackneys, and Ponies.
Joseph Atkinson,
C. M. Nainby,
Sir G. Wombwell, Bart.

Cart Horses.
Alexander Turnbull,
Henry Crosse,
James Steadman.

Shorthorns.
G. Drewry,
Thomas Hunt,
F. Tallant.

Herefords, Devons, and Sussex.
W. Franklin,
H. W. Keary,
Samuel Anstey.

Channel Islands and other Breeds.
C. P. Le Cornu,
John Ellis,
Joseph Druce.

Leicester Sheep.
George Leighton,
George Mann,
T. Twitchell.

Cotswolds and Lincolns.
Charles Clarke,
Richard Lord,
William Bartholomew.

Oxfordshire Downs, Hampshire, and Southdowns.
J. S. Turner,
E. Little,
R. J. Newton.

Shropshires.
T. Horley Jun.
J. Woods.

Pigs.
Albert Edmonds,
Samuel Druce,
J. B. Slater.

JUDGES OF WOOL.

W. Agar, W. H. Ellis.

JUDGES OF BUTTER AND CHEESE.

H. E. Emberlin, E. Etches.

Inspectors of Shearing.

HENRY BONE, J. B. WORKMAN.

Veterinary-Inspectors.

PROFESSOR SIMONDS, PROFESSOR VARNELL.

Assistant.—R. L. HUNT.

JUDGES OF IMPLEMENTS.

Steam-Cultivators.

F. J. BRAMWELL, C.E.
E. A. COWPER, C.E.
JOHN COLEMAN,
JOHN ROOKE,
JOHN HEMSLEY.

Brick and Tile Machines and Miscellaneous.

H. B. CALDWELL,
J. THOMPSON,
EDWARD WORTLEY.

Ploughs.

T. P. DODS,
G. M. HIPWELL,
J. WHEATLEY.

Cultivators, Clod-Crushers, Rollers, and Harrows.

T. CHAMBERS Jun.
F. SHERBORN,
W. ROBERTS.

Consulting-Engineer.

C. E. AMOS.

AWARD OF PRIZES.

NOTE.—The Judges were instructed, besides awarding the Prizes, to designate as the *Reserve Number* one animal in each Class, next in order of merit, if it possessed sufficient merit for a Prize—in case an animal to which a Prize was awarded should subsequently become disqualified.

Special Prizes offered by the Leicestershire and Waltham, and the Loughborough Agricultural Societies, are marked thus (*).

HORSES.

Agricultural Stallions foaled before the 1*st of January*, 1866.

WILLIAM WELCHER, Upwell, Wisbeach, Cambridgeshire: FIRST PRIZE, 25*l.*, for "Honest Tom," bay, 3 years-old; bred by himself; sire, "Thumper;" dam, "Beauty;" sire of dam, "Emperor."

EARL BEAUCHAMP, Madresfield Court, Malvern, Worcestershire: SECOND PRIZE, 15*l.*, for "Young Lofty," bay (Clydesdale), 7 years-old; bred by Mr. S. Clark, Manswrae, Kilbarchan, Renfrewshire.

JOHN EDMONDSON, Extwistle, Burnley, Lancashire: THIRD PRIZE, 5*l.*, for "Young Samson," dark brown, 4 years-old; bred by Messrs. Fitton and Rawstron, Stoneycliffe, Middleton, Manchester; sire, "Young Nonpareil;" sire of dam, "Young Napoleon."

JOHN HENDERSON, Horsley Hill, South Shields, County Durham: the *Reserve Number*, to "Victor," brown, 3 years-old; bred by himself; sire, "George II.;" dam, "Damsel;" sire of dam, "Farmer's Glory."

Agricultural Stallions—Two Years old.

HENRY HITCHCOCK, Chittern Allsaints, Heytesbury, Wilts: FIRST PRIZE, 20*l.*, for "Lion," grey roan (Wiltshire); bred by himself; sire, "Britain;" dam, "Smart;" sire of dam, "Grey Duke."

JOHN MANNING, Orlingbury, Wellingborough, Northamptonshire: SECOND PRIZE, 10*l.*, for "Conqueror," dark brown; bred by Mr. D. Hipwell, Maidwell, Northampton; sire, "Prince of Denmark;" sire of dam, "Black Prince."

HER MAJESTY THE QUEEN, Windsor Castle: THIRD PRIZE, 5*l.*, for "Sandy," bay (Clydesdale); bred by Her Majesty; sire, "The Farmer;" dam, "Young Nell;" sire of dam, "Britain."

THOMAS MIDDLETON, Lyddington, Uppingham, Rutlandshire: the *Reserve Number*, to "Rutland Hero," dark brown; bred by Mr. Scott, Carlton, Rockingham, Northamptonshire; sire, "Farmer's Glory;" sire of dam, "Champion."

Suffolk Stallions foaled before the 1*st of January*, 1866.

WILLIAM WILSON, Baylham Hall, Ipswich: FIRST PRIZE, 25*l.*, for "The

President," chestnut, 3 years old; bred by Mr. J. A. Piggott, Beckingham Hall, Witham, Essex; sire, Mr. Barthropp's "Hero;" sire of dam, Mr. Pledger's "Heart of Oak."

THOMAS CRISP, Butley Abbey, Wickham Market, Suffolk: SECOND PRIZE, 15*l*., for his chestnut, 3 years-old; bred by Mr. Frewer, Debenham, Suffolk; sire, "Duke."

THOMAS CRISP, Butley Abbey: THIRD PRIZE, 5*l*., for "Cupbearer," chestnut, 4 years-old; bred by Mrs. Sargent, Marlesford, Wickham Market; sire, Crisp's "Conqueror;" sire of dam, Crisp's "Prince."

MANFRED BIDDELL, Playford, Ipswich: the *Reserve Number*, to "Punch," chestnut, 4 years-old; bred by Mr. Frost, Shadingfield, Beccles, Suffolk; sire, "Suffolk Captain."

Suffolk Stallions—Two Years old.

GEORGE DAVID BADHAM, Bulmer, Sudbury, Suffolk: FIRST PRIZE, 20*l*., for "Fitz-Emperor," chestnut; bred by Mr. Dupons, Sudbury; sire, "Chester Emperor."

WILLIAM WILSON, Baylham Hall, Ipswich, Suffolk: SECOND PRIZE, 10*l*., for his chestnut; bred by Mr. Sprawle, Stonham, Suffolk; sire, Wilson's "Britton;" sire of dam, Fair's "Prince."

ISAAC RIST, Tattingstone, Ipswich: THIRD PRIZE, 5*l*., for "Young Champion," chestnut, 2 years-old; bred by Sir Edward Kerrison, Bart., Brome Hall, Scole, Suffolk; sire, "Champion;" dam, "Bragg;" sire of dam, "Royal Duke."

Thoroughbred Stallions, suitable for getting Hunters.

SIR GEORGE CHOLMLEY, Bart., of Newton Rillington, Yorkshire: FIRST PRIZE, 100*l*., for "Angelus," chestnut, 8 years-old; bred by himself; sire, "Orpheus;" dam, "Nutmeg;" sire of dam, "Nutwith."

WILLIAM GULLIVER, Swalcliff, Banbury, Oxfordshire: SECOND PRIZE, 50*l*., for "Naseby," bay or brown, 20 years-old; bred by Mr. S. Davis, Swerford Park, Chipping Norton; sire, "Cotherstone;" dam, "Victorine;" sire of dam, "Speculation."

EARL SPENCER, K.G., Althorp, Northampton: THIRD PRIZE, 10*l*., for "General Hesse," chestnut, 11 years-old; bred by Mr. Wyatt, Nutbourne, Emsworth, Hants; sire, "Nabob;" dam, "Lady Alice;" sire of dam, "Lanercost."

OSWALD BAYNES, Pownall Hall, Stockport, Cheshire: the *Reserve Number*, to "Lancer," bay, 3 years-old; bred by Mr. E. Worthington, Heald Green, Wimslow, Cheshire; sire, "Heapy;" dam, "Cairngorm."

Stallions not less than 14 *hands* 2 *inches nor exceeding* 15 *hands* 2 *inches, suitable for getting Hackneys.*

CHARLES BEART, Stow Bardolph, Downham Market, Norfolk: FIRST PRIZE, 25*l*., for "Ambition," red roan, 5 years-old; bred by himself; sire, "Cambridgeshire Phenomenon;" sire of dam, Mr. Baxter's "Performer."

FREDERICK BARLOW, Hasketon, Woodbridge, Suffolk: SECOND PRIZE, 15*l*., for "Lucifer," black brown, 6 years-old; bred by himself; sire, "North Star;" dam, "Gipsy;" sire of dam, "Warrior."

WILLIAM KING, North Luffenham, Stamford, Rutlandshire: THIRD PRIZE, 5*l*., for his bay or brown, 4 years-old; bred by himself; sire, "Footstool;" dam, "Lady Liveden;" sire of dam, "Oscar."

Charles Beart, Stow Bårdolph: the *Reserve Number*, to his red roan, 6 years-old; bred by himself; sire, Baxter's "Performer;" sire of dam, Hewertson's "Champion."

Pony Stallions under 14 *hands* 2 *inches.*

Joseph Baldock, Cropwell Butler, Bingham, Notts: First Prize, 20*l.*, for "Little Jack Horner," chestnut, 5 years-old; bred by himself; sire, "Comet;" dam, "Peg."

Charles Groucock, Stanfield Hall, Wymondham, Norfolk: Second Prize, 10*l.*, for "King Arthur," chestnut, 8 years-old; breeder unknown; sire, "Arthur."

Andrew Doyle, Plas Dulas, Abergele, Denbighshire: Third Prize, 5*l.*, for "Tramp," brown (Welsh), 4 years-old; bred by himself; sire, "Bantam;" dam, "Gipsy."

The Marchioness of Hastings, Donnington Park, Derby: the *Reserve Number*, to "Bobby," brown (Highland), aged; breeder unknown.

**Hunter Mares or Geldings not less than Five Years old.*

Edmund Hornby, Flotmarley, Ganton, Yorkshire: First Prize, 50*l.*, for "Lady Derwent," bay mare, 5 years-old; bred by Thomas Cordmer, Hesberton, Yorkshire; sire, "Coddrington;" dam, "St. Bennett;" sire of dam, "Sursingle."

Captain E. N. Heygate, Buckland, Leominster: Second Prize, 25*l.*, for "Mountain Dew," dark brown gelding, 6 years-old; bred by himself; sire, "The Era;" dam, "Whiskey;" sire of dam, "Whindhound."

William Gilford, North Luffenham, Rutlandshire: the *Reserve Number*, to his bay gelding, 5 years-old; bred by Mr. Myers, Gletton, Uppingham; sire, "Ugly Buck;" sire of dam, "Pollard."

**Hunter Mares or Geldings—Four Years old.*

John B. Booth, Killerby Hall, Catterick, Yorkshire: First Prize, 30*l.*, for "Brigadier," dark brown gelding; bred by Mr. W. Clark, Killerby, Darlington; sire, "Young Voltigeur; sire of dam, "Freedom."

John Drage, Moulton Lodge, Northampton: Second Prize, 15*l.*, for "Gay Lad," brown bay gelding; bred by Mr. Dainty, Thorpe Malsor, Kettering; sire, "Ugly Buck;" sire of dam, "Old Hazard."

William Higgins Potterton, Boughton Grange, Northampton: the *Reserve Number*, to his black gelding; bred by himself; sire, "Lovett;" sire of dam, "Cotherstone."

Mares in foal, or with foal at foot, suitable for breeding Hunters.

John Byron, Kirkby Green, Sleaford, Lincolnshire: First Prize, 25*l.*, for "Maid of the Heath," chestnut, with foal, aged; breeder unknown.

Captain E. N. Heygate, Buckland, Leominster, Herefordshire: Second Prize, 15*l.*, for "Whiskey," dark brown, with foal, 14 years-old; bred by Mr. Doggs, Annan, Dumfriesshire; sire, "Windhound;" dam, "Nancy;" sire of dam, "Dick Andrews."

John Thomas Robinson, Leckby Palace, Topcliffe, Thirsk, Yorkshire: Third Prize, 5*l.*, for "Go-a-head," dark bay, with foal, 10 years-old; breeder unknown; sire, "Sir William;" sire of dam, "President."

JOHN BORLASE TIBBITS, Barton Seagrave, Kettering: the *Reserve Number*, to "Queen of the Vale," bay, with foal, 12 years-old; bred by Mr. W. Bayliss, Hogston, Aylesbury; sire, "Newton;" sire of dam, "Milesius."

Mares not less than 14 *hands* 1 *inch, nor exceeding* 15 *hands* 1 *inch, in foal, or with foal at foot, suitable for breeding Hackneys.*

FRANCIS COOK, Thixendale, York: FIRST PRIZE, 20*l*., for "British Queen," bay, with foal, 10 years-old; bred by himself; sire, "British Champion;" dam, "Evening Star;" sire of dam, "Wildfire."

WILLIAM SOLOMON WOODROFFE, Normanton-on-Soar, Loughborough, Leicestershire: SECOND PRIZE 10*l*., for "Gipsy," chestnut, with foal, aged; breeder unknown.

ALFRED ROBERT HOWLAND, Ludesdon House, Thame, Oxon: THIRD PRIZE, 5*l*., for "Poll," brown, with foal, 21 years-old; bred by Mr. T. Parsons, Waterstock, Wheatley, Oxon; sire, "Merry Driver."

EDWARD BAILEY, Sen., Barkby, Leicester: the *Reserve Number*, to "Black Fanny," black, with foal, 20 years-old; bred by himself; sire, "Nimrod;" dam, "Fanny."

**Hackney Mares or Geldings not exceeding* 15 *hands* 1 *inch, Four Years old and upwards.*

ALGERNON HACK, Buckminster, Granthan, Lincolnshire: FIRST PRIZE, 20*l*., for his bay gelding, 7 years-old; bred by himself; sire, "The Prior."

FREDERICK WOLLASTON, Shenton Hall, Nuneaton, Leicestershire: SECOND PRIZE, 10*l*., for "Eric," chestnut gelding, 5 years-old; bred by Mr. Swan, Barwell Fields, Hinckley;" sire, "Eric."

MRS BAILLIE, Illston Grange, Leicester: the *Reserve Number*, to "Birthday," brown mare, 6 years-old; breeder unknown.

**Cob Mares or Geldings, not exceeding* 14 *hands* 1 *inch, Four Years old and upwards.*

CHARLES GROUCOCK, Stanfield Hall, Wymondham, Norfolk: FIRST PRIZE, 20*l*., for "Champagne Charley," grey gelding, 7 years-old; breeder unknown.

JOHN WARTH, Sutton, Ely, Cambs: SECOND PRIZE, 10*l*., for "Zingari," red roan mare, 5 years-old; bred by Mr. W. Flanders, Littleport, Ely; sire, "Prickwillow."

SIR ARTHUR GREY HAZLERIGG, BART., Noseley Hall, Leicester: the *Reserve Number*, to "Rannoch," grey gelding, 6 years-old; bred by himself; sire, "Ben-y-ghlo;" dam, "Alma."

Pony Mares not exceeding 14 *hands.*

JOHN WARTH, Sutton, Ely, Cambs: FIRST PRIZE, 15*l*., for "Matchless," dark chestnut, 5 years-old; bred by Mr. W. Cockle, Aldreth, Ely, Cambs.; sire, "Prickwillow."

FREDERICK BARLOW, Hasketon, Woodbridge, Suffolk: SECOND PRIZE, 10*l*., for "Piccadilly," black, 7 years-old; breeder unknown.

CHARLES GROUCOCK, Stanfield Hall, Wymondham, Norfolk: THIRD PRIZE, 5*l*., for "Pretty Seeusan," bay, 7 years-old; breeder unknown.

RICHARD MILWARD, Thurgarton Priory, Southwell, Notts: the *Reserve Number*, to "Alice," bay, about 4 years-old; breeder unknown.

Agricultural Mares and Foals.

WILLIAM TENNANT, Barlow, Selby, Yorkshire: FIRST PRIZE, 20*l*., for "Jet," black, 12 years-old; bred by Mr. K. Burton, Cliff, Selby; sire, "Niger;" dam, "Jet;" sire of dam, "Blaze."

JOHN GAY ATTWATER, Britford, Salisbury: SECOND PRIZE, 10*l*., for "Violet, chestnut; age and breeder unknown.

Suffolk Mares and Foals.

SAMUEL WOLTON, jun., Kesgrave, Woodbridge, Suffolk: FIRST PRIZE, 20*l*., for "Violet," chestnut, 6 years-old; bred by himself; sire, "Canterbury Pilgrim;" dam, "Empress;" sire of dam, "Marquis."

Agricultural Fillies—Two Years old.

ROBERT MARPLE, Aston-on-Trent, Derbyshire: FIRST PRIZE, 15*l*., for his chestnut roan; bred by himself; sire, Mr. Styche's "Champion; dam, "Dimon."

THOMAS BALDWIN, Earlswood, Tanworth, Hockley Heath, Warwickshire: SECOND PRIZE, 10*l*., for his red roan; bred by the executors of the late T. Baldwin, Burnt Green Farm, Bromsgrove; sire, W. Wynn's "Sensation;" dam, "Smiler;" sire of dam, Baldwin's "Prince."

HER MAJESTY THE QUEEN, Windsor Castle: THIRD PRIZE, 5*l*., for "Meg," brown, Clydesdale; bred by Her Majesty; sire, "The Farmer;" dam, "Young Mary;" sire of dam, "Britain."

Suffolk Fillies—Two Years old.

MAJOR FULLER MAITLAND WILSON, Stowlangtoft Hall, Bury St. Edmund's, Suffolk: FIRST PRIZE, 15*l*., for "Bury Empress," chestnut; bred by Mr. Frost, Stoke, Colchester; sire, "Harwich Emperor;" dam, "Darby;" sire of dam, "Britton."

MAJOR FULLER MAITLAND WILSON, Stowlangtoft Hall: SECOND PRIZE, 10*l*., for "Violet," chestnut; bred by Mr. Green, Manningtree; sire, "Harwich Emperor;" dam, "Depper;" sire of dam, "Boxer."

ISAAC RIST, Tattingstone, Ipswich, Suffolk: THIRD PRIZE, 5*l*., for "Blossom," chestnut, bred by Mr. Bolton, Buxhall, Stowmarket; sire, "Conqueror;" dam, "Diamond;" sire of dam, "Punch."

ISAAC RIST, Tattingstone, Ipswich: the *Reserve Number*, to "Scott," chestnut; bred by Sir E. Kerrison, Bart., Brome Hall, Soole; sire, "Champion;" dam, "Diamond;" sire of dam, "Havelock."

CATTLE.

Shorthorns—Bulls above Three Years old.

THOMAS CHRISTOPHER BOOTH, Warlaby, Northallerton, Yorkshire: FIRST PRIZE, 25*l*., for "Commander-in-Chief" (21,451), roan, 4 years 1 month 1 week 4 days-old, bred by the late Richard Booth; sire, "Valasco" (15,443); dam, "Campfollower;" sire of dam, "Crown Prince" (10,087).

JONATHAN PEEL, Knowlmere Manor, Clitheroe, Yorkshire: SECOND PRIZE, 15*l*., for "Knight of Knowlmere," white, 4 years 9 months 1 week 6 days-old,

bred by himself; sire, "Sir James" (16,980); dam, "Princess Maud;" sire of dam, "Prince Arthur" (13,497).

WILLIAM CALESS, Bodicote House, Banbury, Oxon: THIRD PRIZE, 5*l*., for "Huntsman" (21,963), roan, 4 years 7 months 2 days-old, bred by himself; sire, "Dusty Miller" (17,765); dam, "Annie" (6833); sire of dam, "Captain Shaftoe."

GEORGE ROBERTSON BARCLAY, Keavil, Dunfermline, Fifeshire: the *Reserve Number*, to "Heir of Englishman" (24,122), roan, 3 years 2 months 2 weeks 1 day-old; bred by himself; sire, "Englishman" (19,701); dam, "Seraphina 13th;" sire of dam, "John O'Gaunt" (16,322).

Shorthorns—Bulls above Two and not exceeding Three Years old.

WILLIAM H. SPENCER ADCOCK, Farndish, Wellingborough, Northamptonshire: FIRST PRIZE, 25*l*., for "Baron Geneva," roan, 2 years 5 months 3 weeks 6 days-old; bred by himself; sire, "Duke of Geneva" (19,614); dam, "Adeline;" sire of dam, "Sir Colin Campbell" (16,961).

LADY PIGOT, Branches Park, Newmarket: SECOND PRIZE, 15*l*., for "Charles le Beau," roan, 2 years 9 months 3 weeks 2 days-old; bred by herself; sire, "British Flag" (19,351); dam, "Lady Grandison;" sire of dam, "Gainforth 5th" (12,913).

THOMAS EDWARD PAWLETT, Beeston, Sandy, Bedfordshire: THIRD PRIZE, 5*l*., for "Baron Warlaby," red and white, 2 years 9 months 1 week 1 day-old; bred by himself; sire, "Breastplate" (19,337); dam, "Faithful;" sire of dam, "Sir James" (16,980).

HUGH AYLMER, West Dereham Abbey, Stoke Ferry, Norfolk: the *Reserve Number*, to "General Hopewell," roan, 2 years 4 weeks old; bred by himself; sire, "General Hopewell" (17,953); dam, "Miss Goldschmidt;" sire of dam, "The Rajah" (18,665).

Shorthorns—Yearling Bulls above One and not exceeding Two Years old.

JOSEPH MEADOWS, Thornville, Wexford, Ireland: FIRST PRIZE, 25*l*., for "Bolivar," roan, 1 year 2 months 3 weeks 5 days-old; bred by himself; sire, "First Fiddle" (19,749); dam, "Blossom 5th;" sire of dam, "Duke of Bedford" (11,378).

LADY PIGOT, Branches Park, Newmarket: SECOND PRIZE, 15*l*., for "Rosalie," roan, 1 year 7 months 4 weeks-old; bred by herself; sire, "Ravenshope" (22,681); dam, "White Ladye;" sire of dam, "Valasco" (15,443).

THOMAS WALKER, of Stowell Park, Northleach, Gloucestershire: THIRD PRIZE, 5*l*., for "The Cotswold Examiner," roan, 1 year 9 months 2 weeks-old; bred by himself; sire, "Slimbridge Duke;" dam, "Kiss 5th;" sire of dam, "Majesty" (18,309).

FRANCIS HAWKESWORTH FAWKES, Farnley Hall, Otley, Yorkshire: the *Reserve Number*, to "Fra Diavolo," roan, 1 year 3 months 3 weeks 1 day-old; bred by himself; sire, "Friar Tuck" (21,781); dam, "Blue Cap;" sire of dam, "Royal Oak" (16,873).

Shorthorns—Bull Calves above Six and not exceeding Twelve Months old.

GEORGE SAVILE FOLJAMBE, Osberton Hall, Worksop, Notts: FIRST PRIZE, 10*l*., for "Knight of the Bath," roan, 8 months 1 week 3 days-old; bred by himself; sire, "Knight of the Garter" (22,062); dam, "May Fly;" sire of dam, "Imperial Windsor" (18,086).

George Savile Foljambe, Osberton Hall: Second Prize, 5*l.*, for "Knight of the Crescent," red, 10 months 2 weeks 5 days-old; bred by himself; sire, "Knight of the Garter" (22,062); dam, "Miss Nightingale;" sire of dam, "May Duke" (16,553).

Francis Hawkesworth Fawkes, Farnley Hall, Otley, Yorkshire: the *Reserve Number*, to "Lord Montgomery," roan, 9 months 3 weeks 1 day-old; bred by himself; sire, "Lord Cobham" (20,164); dam, "Magnolia;" sire of dam, "Royal Oak" (16,873).

Shorthorns—Cows above Three Years old.

Thomas Christopher Booth, Warlaby, Northallerton, Yorkshire: First Prize, 20*l.*, for "Lady Fragrant," roan, in-calf and in-milk, 5 years 4 months 1 day-old; bred by the late Richard Booth; sire, "Lord of the Valley" (14,837); dam, "Lady Blythe;" sire of dam, "Windsor" (14,013).

James How, Broughton, Huntingdon: Second Prize, 10*l.*, for "Jolly Queen," roan, 4 years 3 months 2 weeks 6 days-old, in-calf and in-milk; bred by Mr. John Logan, Maindee House, Newport, Monmouthshire; sire, "Prince of the Empire" (20,578); dam, "Vestal Queen;" sire of dam, "Prince Alfred" (13,494).

Lady Pigot, Branches Park, Newmarket: Third Prize, 5*l.*, for "The Queen of Rosalea," roan, in-calf and in-milk, 3 years 11 months 3 weeks 5 days-old; bred by herself; sire, "Ravenspur" (20,628); dam, "White Ladye;" sire of dam, "Velasco" (15,443).

Robert Tennant, Scarcroft Lodge, Leeds, Yorkshire: the *Reserve Number*, to "Miss Farewell," red and white, in-milk, 4 years 3 months 2 weeks-old; bred by Colonel Towneley, Towneley Park, Burnley; sire, "Duke of Wharfdale;" dam, "Frederick's Farewell;" sire of dam, "Grand Duke of Wetherby."

Shorthorns—Heifers, in-milk or in-calf, not exceeding Three Years old.

Her Majesty the Queen, Windsor Castle: First Prize, 15*l.*, for "Alexandra," roan, in-calf, 2 years 6 months 2 weeks-old, bred by Her Majesty; sire, "Prince of Saxe-Coburg" (20,576); dam, "Annette;" sire of dam, "Prince Alfred" (13,494).

Lady Pigot, Branches Park, Newmarket: Second Prize, 10*l.*, for "The Dame of Rosalea," roan, in-calf, 2 years 11 months 2 weeks 1 day-old, bred by herself; sire, "British Flag" (19,351); dam, "White Ladye;" sire of dam, "Velasco" (15,443).

Lord Walsingham, Merton Hall, Thetford, Norfolk: Third Prize, 5*l.*, for "Thoughtless," light roan, in-calf, 2 years 3 months 3 weeks 6 days-old; bred by himself; sire, "Merton Beau" (20,345); dam, "Dauntless;" sire of dam, "Great Mogul" (14,651).

James Bailey, North Lodge, Mansfield, Nottinghamshire: the *Reserve Number*, to "Juanita 2nd," roan, in-calf, 2 years 1 month 3 weeks 3 days-old; bred by the late Mr. W. Fletcher, Radmanthwaite, Mansfield; sire, "Prince of Butterflies;" dam, "Juanita;" sire of dam, "Schamyl Bey."

Shorthorns—Yearling Heifers above One and not exceeding Two Years old.

James How, Broughton, Huntingdon: First Prize, 15*l.*, for "Lady Anne," red and white, in-calf, 1 year 10 months 2 weeks 2 days-old; bred by Mr.

J. Logan, of Maindee House, Newport, Monmouthshire; sire, "Prince of the Empire" (20,578); dam, "Ladye Elinor;" sire of dam, "Sir Roger" (16,991).

THOMAS CHRISTOPHER BOOTH, Warlaby, Northallerton, Yorkshire: SECOND PRIZE, 10*l.*, for "Patricia," roan, 1 year 3 months 2 weeks-old; bred by himself; sire, "Lord Blithe" (22,126); dam, "Alfreda;" sire of dam, "Prince Alfred" (13,494).

GEORGE GARNE, Churchill Heath, Chipping Norton: THIRD PRIZE, 5*l.*, for "Duchess of Towneley," red, in-calf, 1 year 11 months 1 week 1 day-old; bred by himself; sire, "Duke of Towneley" (21,615); dam, "Donna Inez;" sire of dam, "Gondomar" (17,985).

THOMAS CHRISTOPHER BOOTH, Warlaby: the *Reserve Number*, to "Lady Gaiety," roan, 1 year 5 months 3 weeks 5 days-old; bred by himself; sire, "Lord of the Valley" (14,837); dam, "Lady Blythe;" sire of dam, "Windsor" (14,013).

Shorthorns—Heifer Calves above Six and under Twelve Months old.

LORD PENRHYN, Penrhyn Castle, Bangor, Caernarvonshire: FIRST PRIZE, 10*l.*, for "Waterloo 26th," red and white, 10 months 1 week-old; bred by himself; sire, "Duke of Geneva" (19,614); dam, "Waterloo 24th;" sire of dam, "Cherry Duke 2nd" (14,265).

RICHARD STRATTON, Walls Court, Bristol: SECOND PRIZE, 5*l.*, for "Ariel," rich roan, 8 months 2 weeks 4 days-old; bred by himself; sire, "Bude Light;" dam, "Miranda;" sire of dam, "Knight of the Lagan."

GEORGE SAVILE FOLJAMBE, Osberton Hall, Worksop, Notts: the *Reserve Number*, to "Flora," roan, 7 months 2 weeks 5 days-old; bred by himself; sire, "Falstaff" (21,720); dam, "Florence;" sire of dam, "Imperial Windsor" (18,086).

Herefords—Bulls above Three Years old.

THOMAS ROGERS, Coxall, Brampton Bryan, Herefordshire: FIRST PRIZE, 25*l.*, for "Batter Hall" (2406); red, white face, 5 years 11 months 4 days-old; bred by Mr. T. Roberts, Ivington Bury, Leominster; sire, "Sir Thomas" (2228); dam, "Duchess;" sire of dam, "King James" (978).

JOHN WILLIAMS, St. Mary's, Kingsland, Leominster, Herefordshire: SECOND PRIZE, 15*l.*, for "Sir George," red, white face, 4 years 11 months 2 weeks 2 days-old; bred by Mr. B. Rogers, The Grove, Pembridge, Leominster; sire, "Interest;" dam, "Pretty Maid;" sire of dam, "The Grove."

JOSEPH RAWLE PARAMORE, Dinedor Court, Hereford: THIRD PRIZE, 5*l.*, for "Dinedor," red, white face, 4 years 8 months 2 weeks 2 days-old; bred by himself; sire, "The Jew" (2266); dam, "Young Countess;" sire of dam, "Carlisle" (923).

HER MAJESTY THE QUEEN, Windsor Castle: the *Reserve Number*, to "Deception," red, white face, 5 years 11 months 1 week 6 days-old; bred by the late Mr. J. Rea, Monaughty, Knighton, Radnorshire; sire, "Sir Benjamin;" dam, "Nonsuch;" sire of dam, "Wellington."

Herefords—Bulls above One and not exceeding Three Years old.

JOHN HUNGERFORD ARKWRIGHT, Hampton Court, Leominster, Herefordshire: FIRST PRIZE, 25*l.*, for "Sir Hungerford," red, white face, 2 years 10 months 1 week-old; bred by himself; sire, "Dan. O'Connell" (1952), dam, "Nutty;" sire of dam, "Mortimer" (1328).

THOMAS DUCKHAM, Baysham Court, Ross, Herefordshire: SECOND PRIZE, 15*l.*, for "Reginald," red, white face, 2 years 11 months 3 days-old; bred by himself; sire, "Franky" (1243); dam, "Carlisle;" sire of dam, "Albert Edward" (1859).

JAMES TAYLOR, Stretford Court, Leominster, Herefordshire: THIRD PRIZE, 5*l.*, for "Challenge," red, white face, 2 years 8 months 4 days-old; bred by himself; sire, "Santiago" (2742); dam, "Damsel;" sire of dam, "Gay Lad 2nd" (1589).

WILLIAM LORT, The Cotteridge, Birmingham: the *Reserve Number*, to "King Theodore," red, white face, 2 years 8 months 6 days-old; bred by himself; sire, "Gamester" (2000); dam, "Loo;" sire of dam, "Gambler" (1247).

Herefords—Yearling Bulls above One and not exceeding Two Years old.

WILLIAM TUDGE, Adforton, Leintwardine, Herefordshire: FIRST PRIZE, 25*l.*, for "Brandon," red, white face, 1 year 11 months 1 week 1 day-old; bred by himself; sire, "Chieftain 4th" (2458); dam, "Darling;" sire of dam, "Carbonel" (1525).

HER MAJESTY THE QUEEN, Windsor Castle: SECOND PRIZE, 15*l.*, for "Prince Leopold," red, white face, 1 year 9 months 1 week-old; bred by her Majesty; sire, "Deception;" dam, "Maud;" sire of dam, "Windsor."

JOSEPH RAWLE PARAMORE, Dinedor Court, Hereford: THIRD PRIZE, 5*l.*, for "Chancellor," red, white face, 1 year 10 months 4 days-old; bred by himself; sire, "Portly" (2165); dam, "Cherry 2nd;" sire of dam, "The General" (2817).

Herefords—Bull Calves above Six and not exceeding Twelve Months old.

WILLIAM TUDGE, Adforton, Leintwardine, Herefordshire: FIRST PRIZE, 10*l.*, for "Landseer," red, white face, 11 months 2 weeks 5 days-old; bred by himself; sire, "Artist;" dam, "Darling;" sire of dam "Carbonel" (1525).

Herefords—Cows above Three Years old.

JOHN HUNGERFORD ARKWRIGHT, Hampton Court, Leominster, Herefordshire: FIRST PRIZE, 20*l.*, for "Hampton Beauty," red, white face, in-calf, 4 years-old; bred by himself; sire, "Sir Oliver 2nd" (1733); dam, "Beauty."

HER MAJESTY THE QUEEN, Windsor Castle: SECOND PRIZE, 10*l.*, for "Agnes," red, white face, in-milk, 5 years 2 weeks 4 days-old; bred by Mr. James Rea, Monaughty, Knighton, Radnorshire; sire, "Sir Benjamin;" dam, "Sweetbriar 2nd;" sire of dam, "Wellington."

HENRY RAWLINS EVANS, jun., Swanstone Court, Dilwyn, Leominster: THIRD PRIZE, 5*l.*, for "Stately 2nd," red, white face, in-calf, 8 years 3 months 2 weeks 1 day old; bred by himself; sire, "Rambler" (1046); dam, "Stately;" sire of dam, "Swanstone" (1072).

THOMAS ROGERS, Coxall, Brampton Bryan, Herefordshire: the *Reserve Number* to "Gentle Annie," red, white face, in-milk, 3 years 11 months 1 week 3 days-old; bred by himself; sire, "Grove 2nd" (2556); dam, "Gentle."

Herefords—Heifers in-milk or in-calf, not exceeding Three Years old.

SAMUEL PLIMLEY, Alderbury, Shrewsbury: FIRST PRIZE, 15*l.*, for his red, white face, in-calf, 1 years 9 months 3 weeks 3 days-old; bred by himself; sire, "Hazard;" dam, "Lucy;" sire of dam, "Lord Nelson."

JOHN PROSSER, Honeybourne Grounds, Broadway, Gloucestershire: SECOND PRIZE, 10*l.*, for "White Rose," red, white face, in-milk, 2 years 8 months 2 days old; bred by himself; sire, "The Jew;" dam, "Marigold;" sire of dam, "Dutiful."

JOHN PROSSER, Honeybourne Grounds: THIRD PRIZE, 5*l.*, for "Carrie," red, white face, in-milk, 2 years 9 months 1 week 4 days-old; bred by himself; sire, "The Jew;" dam, "Dell;" sire of dam, "Lacey."

Herefords—Yearling Heifers above One and not exceeding Two Years old.

JOHN HUNGERFORD ARKWRIGHT, Hampton Court, Leominster, Herefordshire: FIRST PRIZE, 15*l.*, for his red, white face, 1 year 5 months 1 week 3 days-old; bred by himself; sire, "Hampton Oliver;" dam, "Gaylass;" sire of dam "Riff Raff."

HER MAJESTY THE QUEEN: SECOND PRIZE, 10*l.*, for "Duchess de Bronté," red, white face, 1 year 11 months 2 weeks 1 day-old; bred by her Majesty; sire, "Deception;" dam, "Phœbe;" sire of dam, "Brecon."

WILLIAM TUDGE, Adforton, Leintwardine: THIRD PRIZE, 5*l.*, for "Diadem," red, white face, 1 year 11 months-old; bred by himself; sire, "Chieftain 4th" (2458); dam, "Deborah;" sire of dam, "Pilot" (2156).

JOHN HUNGERFORD ARKWRIGHT, Hampton Court: the *Reserve Number* to his red, white face, 1 year 11 months 3 weeks 4 days-old; bred by himself; sire, "Hampton Oliver;" dam, "Violet;" sire of dam, "Mortimer" (1328).

Herefords—Heifer Calves above Six and under Twelve Months old.

WILLIAM TUDGE, Adforton, Leintwardine: FIRST PRIZE, 10*l.*, for "Silver Star;" red, white face, 10 months 3 weeks-old; bred by himself; sire, "Stanway" (2790); dam, "Duchess 3rd;" sire of dam "Harold" (2029).

JOHN WILLIAMS, St. Mary's, Kingsland, Leominster, Herefordshire: SECOND PRIZE, 5*l.*, for "Flower Girl," red, white face, 11 months 3 weeks-old; bred by himself; sire, "St. George;" dam, "Red Rose;" sire of dam, "Riff Raff."

Devons—Bulls above Three Years old.

GEORGE TURNER, Brampford Speke, Exeter, Devonshire: FIRST PRIZE, 25*l.*, for "Albert Victor," red, 3 years 6 months 1 week 3 days-old; bred by himself; sire, "Leotard;" dam, "Vaudine;" sire of dam, "Palmerston."

VISCOUNT FALMOUTH, Tregothnan, Truro: SECOND PRIZE, 15*l.*, for "Sunflower," 5 years 4 months 3 weeks 5 days-old; bred by himself; sire, "Duke of Chester" (404); dam, "Flower;" sire of dam, "Uncle Tom."

THOMAS DAVY, Flitton Barton, North Molton, South Molton, Devonshire: THIRD PRIZE, 5*l.*, for "Duke of Flitton the 3rd," red, 3 years 8 months 1 week-old; bred by himself; sire, "Duke of Flitton the 2nd;" dam, "Picture;" sire of dam, "Palmerston."

JOHN BODLEY, Stockley Pomeroy, Crediton, Devonshire: the *Reserve Number*, to "Lincoln," red, 4 years 6 months 1 week-old; bred by himself; sire, "Champion" (588); dam, "Myrtle" (2191); sire of dam, "Emperor" (193).

Devons—Bulls above Two and not exceeding Three Years old.

WALTER FARTHING, Stowey Court, Bridgwater, Somersetshire: FIRST PRIZE, 25*l.*, for "St. Audries," red, 2 years 6 months 2 weeks 4 days-old; bred by Sir A. A. Hood, Bart., M.P.. St. Audries, Bridgwater; sire, "Master Ellic;" dam, "Dairymaid."

Devons—Yearling Bulls above One and not exceeding Two Years old.

JOHN A. SMITH, Bradford Peverell, Dorchester, Dorsetshire: FIRST PRIZE, 25*l.*, for "Triumph," red, 1 year 2 months 4 weeks-old; bred by himself; sire, "Trio;" dam, "Young Hebe" (2450); sire of dam, Davey's "Napoleon 3rd" (646).

WALTER FARTHING, Stowey Court, Bridgwater, Somersetshire: SECOND PRIZE, 15*l.*, for "Master Arthur," red, 1 year 2 months 6 days-old; bred by Sir A. A. Hood, Bart., M.P., St. Audries, Bridgwater; sire, "Master Ellic;" dam, "Miss Battersea;" sire of dam, "Sir Peregrine."

JAMES HOWARD BULLER, Downes, Crediton, Devonshire: THIRD PRIZE, 5*l.*, for his red, 1 year 9 months 4 weeks 2 days-old; bred by himself.

WILLIAM SMITH, Higher Hoopern, Exeter, Devonshire: the *Reserve Number*, to his brown, 1 year 2 months 4 weeks-old; bred by himself; sire, "Young Exeter;" dam, "Cherry."

Devons—Bull Calves above Six and not exceeding Twelve Months old.

WALTER FARTHING, Stowey Court, Bridgwater, Somersetshire: FIRST PRIZE, 10*l.*, for "Napier," red, 8 months 1 week 3 days-old; bred by himself; dam, "Julia;" sire of dam, "Lord Quantock."

GEORGE TURNER, Brampford Speke, Exeter, Devonshire: SECOND PRIZE, 5*l.*, for "Earl of Leicester," red, 6 months 3 weeks 2 days-old; bred by himself; sire, "Albert Victor;" dam, "Duchess 1st;" sire of dam, "Napoleon."

JOHN A. SMITH, Bradford Peverell, Dorchester, Dorsetshire: the *Reserve Number*, to "Blink Bonny," red, 8 months 2 weeks 6 days-old; bred by himself; sire, "Trio;" dam, "Curley;" sire of dam, "Duke of Flitton" (613).

Devons—Cows above Three Years old.

JOHN A. SMITH, Bradford Peverell, Dorchester, Dorsetshire: FIRST PRIZE, 20*l.*, for "Daisy," red, in-milk, 4 years 6 months 1 week-old; bred by himself; sire, "Constitution;" dam, "Daisy" (1909); sire of dam, "Sherborne" (119).

WILLIAM SMITH, Higher Hoopern, Exeter: SECOND PRIZE, 10*l.*, for his brown, in-calf, 5 years 5 months 3 weeks 1 day-old; bred by himself; sire, "Astonisher" (562); dam, "Broad" (1820); sire of dam, "Albert" (360).

WALTER FARTHING, Stowey Court, Bridgwater, Somersetshire: THIRD PRIZE, 5*l.*, for "Lady," red, in-milk, 5 years 6 months 3 weeks 3 days-old; bred by Sir A. A. Hood, Bart., M.P., St. Audries, Bridgwater; sire, "Perfection;" dam, "Lady;" sire of dam, "Sir Peregrine."

HER MAJESTY THE QUEEN, Windsor Castle: the *Reserve Number*, to "Rose of Denmark," red, in-milk; bred by her Majesty; sire, "Colonel;" dam, "Fancy;" sire of dam, "William."

Devons—Heifers in-milk or in-calf, not exceeding Three Years old.

James Howard Buller, Downes, Crediton, Devonshire: First Prize, 15*l.*, for his red, in-calf, 2 years 8 months 3 days-old; bred by himself.

Charles Hambro, Milton Abbey, Blandford, Dorsetshire: Second Prize, 10*l.*, for "Mary," red, in-calf, 2 years 11 months 4 weeks old; bred by himself; sire, "Lord Derby" (667); dam, "Lina" (2354); sire of dam, "Sir Oliver."

Walter Farthing, Stowey Court, Bridgwater, Somersetshire: Third Prize, 5*l.*, for "Miss Bessie," red, in-calf, 2 years 5 months 4 weeks 1 day-old; bred by himself; sire, "Viscount."

George Turner, Brampford Speke, Exeter: the *Reserve Number*, to "Lady Mary," red, in-calf, 2 years 5 months 3 weeks 6 days-old; bred by himself; sire, "Leotard;" dam, "Lady Devon;" sire of dam "Napoleon."

Devons—Yearling Heifers above One and not exceeding Two Years old.

William Smith, Higher Hoopern, Exeter, Devonshire: First Prize, 15*l.*, for his brown, 1 year 8 months 2 weeks-old; bred by himself; sire, "Young Exeter;" dam, "Buttercup."

John A. Smith, Bradford Peverell, Dorchester, Dorsetshire: Second Prize, 10*l.*, for "Fancy," red, 1 year 8 months 2 weeks 5 days-old; bred by himself; sire, "Earl of Exeter;" dam, "Fancy" (1977); sire of dam, "Constitution."

Walter Farthing, Stowey Court, Bridgwater, Somersetshire: Third Prize, 5*l.*, for "Miss Laura," red, 1 year 6 months 3 weeks 6 days-old; bred by himself; sire, "Viscount;" dam, "Lofty;" sire of dam, "Sir Peregrine."

Charles Hambro, Milton Abbey, Blandford, Dorsetshire: the *Reserve Number*, to "Princess," red, 1 year 10 months 2 weeks 4 days-old; bred by himself; sire, "Goldfinder;" dam, "Prim;" sire of dam, "Palmerston."

Devons—Heifer-Calves above Six and under Twelve Months old.

Her Majesty the Queen, Windsor Castle: First Prize, 10*l.*, for "Rosa," red, 11 months-old; bred by her Majesty; sire, "Prince Alfred;" dam, "Daphne;" sire of dam, "Saracen."

John A. Smith, Bradford Peverell, Dorchester, Dorsetshire: Second Prize, 5*l.*, for "Picture," red, 9 months 1 week 1 day-old; bred by himself; sire, "Earl of Exeter;" dam, "Picture;" sire of dam, "Constitution."

James Howard Buller, Downes, Crediton, Devonshire: the *Reserve Number*, to his red, 7 months 5 days-old; bred by himself.

Sussex—Bulls above One Year old.

William Marshall, Bolney Place, Cuckfield, Sussex: First Prize, 15*l.*, for "Napier," red, 1 year 4 months 2 weeks 2 days-old; bred by himself; sire, "Midsummer;" dam, "Dash;" sire of dam, "Dorris."

Sussex—Cows above Three Years old.

John and Alfred Heasman, Angmering, Arundel, Sussex: First Prize, 15*l.*, for "Ada," red, in-milk, 8 years 5 months 3 weeks 4 days-old; bred by themselves; sire, "Marquis" (16); dam, "Greatham."

Sussex—Heifers in-milk or in-calf, not exceeding Three Years old.

JOHN and ALFRED HEASMAN, Angmering, Arundel, Sussex: FIRST PRIZE, 15*l.*, for "Leicester," red, in calf, 1 year 9 months 1 week 5 days-old; bred by themselves, sire, "Prince Arthur" (129); dam "Plymouth" (1024); sire of dam, "Duke" (97).

WILLIAM MARSHALL, Bolney Place, Cuckfield, Sussex: SECOND PRIZE, 10*l.*, for "Caroline," red, in-calf, 2 years 10 months 4 days-old; bred by himself; sire, "Midsummer;" dam, "Cowslip;" sire of dam, "Prince Alfred."

Channel Islands—Bulls above One Year old.

CLEMENT PALLOT, St. Saviour's, Jersey: FIRST PRIZE, 15*l.*, for "Sultan." light brown, 2 years 3 months 4 days-old (Jersey); bred by C. Lesbirel, Trinity, Jersey; sire, "Prince;" dam, "Flower" (53).

PHILIP GAUDIN, Spring Farm, St. Martin's, St. Helier's, Jersey: SECOND PRIZE, 10*l.*, for "Clement;" light red, 1 year 11 months 3 weeks 2 days-old (Jersey); bred by Mr. E. Gibaut, St. Lawrence, St. Helier's, Jersey; sire, "Willie;" dam, "Clementine."

CLEMENT PALLOT, St. Saviour's Jersey: *the Reserve Number* to "Black-tail" (93); grey, 1 year 2 months-old (Jersey): bred by J. Horman, St. Peter's, Jersey; sire, "Imperial" (37).

Channel Islands—Cows above Three Years old.

PHILIP GAUDIN, Spring Farm: FIRST PRIZE, 15*l.*, for "Ladybird," grey, in-milk, 4 years 10 months 1 week-old (Jersey); bred by himself: dam, "Maid of Plymouth."

PHILIP GAUDIN, Spring Farm: SECOND PRIZE, 10*l.*, for "Lady Best," light brown, in-milk, 7 years 2 months-old (Jersey); bred by himself.

PHILIP GAUDIN, Spring Farm: the *Reserve Number*, to "Brunette," dark brown, in-milk, 6 years 2 months-old (Jersey); bred by himself.

Channel Islands—Heifers, in-milk or in-calf, not exceeding Three Years old.

CLEMENT PALLOT, St. Saviour's; FIRST PRIZE, 15*l.*, for "Shorthorn," pale red and white, in-calf, 2 years 3 months 3 weeks 6 days-old (Jersey); bred by himself; sire, "Welcome," dam, "Shepherdess" (20).

PHILIP GAUDIN, Spring Farm, St. Martin's, St. Helier's, Jersey: SECOND PRIZE, 10*l.*, for "Camelia," red and white, in-calf. 2 years 4 weeks 1 day-old (Jersey); bred by himself; dam, "Maid of Plymouth."

PHILIP GAUDIN, Spring Farm: the *Reserve Number*, to "Fanny," red and white, in-calf, 2 years 1 month-old (Jersey); bred by Mr. E. Gibaut, St. Lawrence, St. Helier's.

Other established breeds, not including the Shorthorn, Hereford, Devon, Sussex, or Channel Islands breed,—Bulls above One Year old.

THE DUKE OF BUCKINGHAM AND CHANDOS, Stowe Park, Buckingham: FIRST PRIZE, 15*l.*, for "Conqueror," red brindled, 4 years 2 months 1 week-old (Longhorn); bred by Mr. Godfrey, Wigston Parva, Hinckley, Leicestershire.

JOSEPH HOLLAND BURBERY, The Chase, Kenilworth, Warwickshire: SECOND PRIZE, 10*l.*, for his coloured and white, 3 years 3 months-old (Longhorn); bred by Mr. Twycross, Canley, Coventry.

LORD SONDES, Elmham Hall, Thetford, Norfolk: the *Reserve Number*, to "Cupid," red, 3 years 6 months-old (Norfolk Polled): bred by Mr. T. Brown, Marham Hall Farm, Downham, Norfolk.

Other established breeds—Cows above Three Years old.

RICHARD HEMMING CHAPMAN, Upton, Nuneaton: FIRST PRIZE, 15*l.*, for "Brindled Beauty," brindled and white, in-milk. 5 years 3 months 2 weeks-old (Pure Longhorn): bred by himself; sire, "Old Sparkenhoe," dam, "Fillpail;" sire of dam, "Washington."

JOHN GODFREY, Wigston Parva: SECOND PRIZE, 10*l.*, for "Red Rose," red and white, in-milk and in-calf, 9 years 2 months 3 weeks-old (Longhorn); sire, "Perfection;" dam, "Fillpail;" sire of dam, "Conqueror."

SIR JOHN HARPER CREWE, Bart., Calke Abbey, Derby: the *Reserve Number* to "Lofty," red, in-milk and in-calf, about 7 years-old (Longhorn); bred by the late Hon. R. Curzon, Hagley Hall, Staffordshire.

Other established breeds,—Heifers in-milk or in-calf, not exceeding Three Years old.

RICHARD HEMMING CHAPMAN, Upton, Nuneaton: FIRST PRIZE, 15*l.*, for "Rose of Dishley," coloured and white, in-calf, 1 year 1 month 3 weeks 3-days old (Longhorn); bred by himself; sire, "Earl of Derby;" dam, "Countess of Leicester;" sire of dam, "Sir Richard Warner."

LORD SONDES, Elmham Hall, Thetford, Norfolk: SECOND PRIZE, 10*l.*, for "Cherry IVth," red, in-calf, 2 years-old (Norfolk Polled); bred by himself.

LORD SONDES, Elmham Hall: the *Reserve Number* to "Kate," red, in-calf, 2 years old (Norfolk Polled); bred by Mr. W. Bradfield, Ramsley Farm, Elmham.

SHEEP.

Leicesters—Shearling Rams.

LIEUT.-COLONEL WILLIAM INGE, Thorpe Constantine, Tamworth: FIRST PRIZE, 20*l.*, for his 1 year 4 months-old; bred by himself; sire, "C," sire of dam, "B."

GEORGE HENRY SANDAY, Holme Pierrepont, Nottingham; SECOND PRIZE, 10*l.*, for his 1 year 4 months-old; bred by himself; sire, "D X."

JOHN BORTON, Barton House, Barton-le-Street, Malton: THIRD PRIZE, 5*l.*, for his 1 year 3 months-old; bred by himself.

GEORGE TURNER, Jun., Alexton Hall, Uppingham: the *Reserve Number*, to his 1 year 3 months 2 weeks-old; bred by himself.

Leicesters—Rams of any other Age:

GEORGE TURNER, Jun., Alexton Hall, Uppingham, Leicestershire: FIRST PRIZE, 20*l.*, for his 2 years 3 months 2 weeks-old; bred by himself.

JOHN BORTON: Barton House, Barton-le-Street, Malton: SECOND PRIZE, 10*l.*, for his 3 years 3 months-old; bred by himself.

GEORGE HENRY SANDAY, Holme Pierrepont, Nottingham: THIRD PRIZE, 5*l.*, for his 3 years 2 months old; bred by himself.

JOHN BORTON, Barton House: the *Reserve Number*, to his 3 years 3 months-old; bred by himself.

Leicesters—Pens of Five Shearling Ewes of the same Flock.

LIEUT.-COLONEL WILLIAM INGE, Thorpe Constantine, Tamworth, Staffordshire: FIRST PRIZE, 15*l*., for his 1 year 4 months-old; bred by himself.

JOHN BORTON, of Barton House, Barton-le Street: SECOND PRIZE, 10*l*., for his 1 year 3 months-old; bred by himself.

LIEUT.-COLONEL WILLIAM INGE, Thorpe Constantine: THIRD PRIZE, 5*l*., for his 1 year 4 months-old; bred by himself.

WILLIAM BROWN, High Gate, Holme on Spalding Moor, Yorkshire: the *Reserve Number*, to his 1 year 3 months-old; bred by himself.

*Leicesters—*Pens of Five Breeding Ewes which have suckled Lambs until the First of June*, 1868.

LIEUTENANT-COLONEL INGE, Thorpe Constantine, Tamworth, Staffordshire: FIRST PRIZE, 15*l*., for his various ages; bred by himself.

WILLIAM BROWN, High Gate, Holme on Spalding Moor, Yorkshire: SECOND PRIZE, 10*l*., for his various ages; bred by himself.

LORD BERNERS, Keythorpe Hall, Leicester: the *Reserve Number*, to his various ages; bred by himself.

Cotswolds—Shearling Rams.

THOMAS BROWN, Marham Hall Farm, Downham Market: FIRST PRIZE, 20*l*., for his 1 year 4 months 2 weeks-old; bred by himself.

JOHN GILLETT, Oaklands, Charlbury, Oxon: SECOND PRIZE, 10*l*., for his 1 year 4 months 2 weeks-old; bred by himself.

JOHN GILLETT, Minster Lovell, Witney, Oxon: THIRD PRIZE, 5*l*., for his 1 year 3 months 2 weeks-old; bred by himself.

THOMAS BROWN, Marham Hall Farm, Downham Market, the *Reserve Number*, to his 1 year 4 months 2 weeks-old; bred by himself.

Cotswolds—Rams of any other Age.

JOHN KING TOMBS, Langford, Lechlade: FIRST PRIZE, 20*l*., for his 3 years 4 months-old; bred by Mr. Lane, of Broadfield, Northleach, Gloucestershire.

JOHN GILLETT, Minster Lovell, Witney, Oxfordshire: SECOND PRIZE, 10*l*., for his 4 years 3 months-old; bred by himself.

THOMAS BROWN, Marham Hall Farm: THIRD PRIZE, 5*l*., for his 3 years 4 months 2 weeks-old; bred by himself.

THOMAS BROWN, Marham Hall Farm: the *Reserve Number*, to his 2 years 4 months 2 weeks-old; bred by himself.

Cotswolds—Pens of Five Shearling Ewes of the same Flock.

JOHN GILLETT, Minster Lovell, Witney, Oxon.: FIRST PRIZE, 15*l*., for his 1 year 3 months-old; bred by himself.

THOMAS BROWN, Marham Hall Farm, Downham Market, Norfolk: SECOND PRIZE, 10*l*., for his 1 year 4 months 2 weeks-old; bred by himself.

JOHN KING TOMBS, Langford, Lechlade, Gloucestershire: THIRD PRIZE, 5*l*., for his 1 year 4 months-old; bred by himself.

THOMAS BROWN, Marham Hall Farm: the *Reserve Number*, to his 1 year 4 months 2 weeks-old; bred by himself.

Lincolns and other Long Wools—Shearling Rams not qualified to compete as Leicesters or Cotswolds.

ROBERT WRIGHT, Nocton Heath, Nocton, Lincolnshire: FIRST PRIZE, 20*l.*, for his 1 year 4 months-old; bred by himself.

CHARLES WILLIAMS, Carlton-le-Moorland, Newark: SECOND PRIZE, 10*l.*, for his 1 year 3 months 2 weeks-old; bred by himself.

WILLIAM FRANCIS MARSHALL, Branston, Lincolnshire: THIRD PRIZE, 5*l.*, for his 1 year 4 months 2 weeks-old; bred by himself.

ROBERT WRIGHT, Nocton Heath: the *Reserve Number*, to his 1 year 4 months-old; bred by himself.

Lincolns and other Long Wools—Rams of any other Age.

WILLIAM FRANCIS MARSHALL, Branston, Lincolnshire: FIRST PRIZE, 20*l.*, for his 4 years 4 months 2 weeks-old; bred by the late Mr. T. B. Marshall, Branston.

WILLIAM FRANCIS MARSHALL, Branston: SECOND PRIZE, 10*l.*, for his 2 years 4 months 2 weeks-old; bred by the late Mr. T. B. Marshall, Branston, Lincolnshire.

MESSRS. DUDDING, Panton House, Wragby, Lincolnshire, the *Reserve Number*, to their "Young Champion," 2 years 3 months 3 weeks-old; bred by themselves; s. "Champion."

Lincolns and other Long Wools—Pens of Five Shearling Ewes of the same Flock.

THOMAS CARTWRIGHT, Dunston Pillar, Dunston, Lincolnshire: FIRST PRIZE, 15*l.*, for his 1 year 4 months-old; bred by himself.

JOHN PEARS, Mere, Lincolnshire: SECOND PRIZE, 10*l.*, for his 1 year 4 months-old; bred by himself.

ROBERT WRIGHT, Nocton Heath: THIRD PRIZE, 5*l.*, for his 1 year 4 months-old; bred by himself.

THOMAS CARTWRIGHT, Dunston Pillar: the *Reserve Number*, to his 1 year 4 months old; bred by himself.

Oxfordshire Downs—Shearling Rams.

GEORGE WALLIS, Old Shifford, Bampton, Faringdon: FIRST PRIZE, 20*l.*, for his 1 year 5 months 2 weeks-old; bred by himself.

GEORGE WALLIS, Old Shifford: SECOND PRIZE, 10*l.*, for his 1 year 5 months 2 weeks-old; bred by himself.

JOSEPH ROBERTS, Caswell Farm: THIRD PRIZE, 5*l.*, for his 1 year 4 months-old; bred by himself.

GEORGE WALLIS, Old Shifford: the *Reserve Number*, to his 1 year 5 months 2 weeks old; bred by himself.

Oxfordshire Downs—Rams of any other Age.

GEORGE WALLIS, Old Shifford: FIRST PRIZE, 20*l.*, for his 3 years 5 months 2 weeks-old; bred by himself.

JOHN TREADWELL, Upper Winchendon, Aylesbury, Buckinghamshire: SECOND PRIZE, 10*l.*, for "Brackwell," about 6 years 4 months 2 weeks-old; bred by the Executors of the late Samuel Treadwell.

CHARLES HOWARD, Biddenham, Bedfordshire: the *Reserve Number*, to his 2 years 4 months 2 weeks-old; bred by himself.

Oxfordshire Downs—Pens of Five Shearling Ewes of the same Flock.

GEORGE WALLIS, Old Shifford, Bampton, Faringdon: FIRST PRIZE, 15*l.*, for his 1 year 5 months 2 weeks-old; bred by himself.

HENRY OVERMAN, Weasenham, Brandon, Norfolk: SECOND PRIZE, 10*l.*, for his 1 year 4 months 2 weeks-old; bred by himself.

SIR HENRY WILLIAM DASHWOOD, Bart., Kirtlington Park, Oxfordshire: THIRD PRIZE, 5*l.*, for his 1 year 4 months-old; bred by himself.

CHARLES HOWARD, Biddenham: the *Reserve Number*, to his 1 year 4 months 2 weeks-old; bred by himself.

Southdowns—Shearling Rams.

WILLIAM RIGDEN, Hove, Brighton, Sussex: FIRST PRIZE, 20*l.*, for his 1 year 4 months-old; bred by himself.

LORD WALSINGHAM, Merton Hall, Thetford, Norfolk: SECOND PRIZE, 10*l.*, for his 1 year 4 months-old; bred by himself.

LORD WALSINGHAM, Merton Hall: THIRD PRIZE, 5*l.*, for his 1 year 4 months-old; bred by himself.

LORD WALSINGHAM, Merton Hall: the *Reserve Number*, to his 1 year 4 months-old; bred by himself.

Southdowns—Rams of any other Age.

WILLIAM RIGDEN, Hove, Brighton, Sussex: FIRST PRIZE, 20*l.*, for his 2 years 4 months-old; bred by himself.

LORD WALSINGHAM, Merton Hall: SECOND PRIZE, 10*l.*, for his 3 years 4 months-old; bred by himself.

SIR WILLIAM THROCKMORTON, Bart., Buckland, Faringdon, Berkshire: THIRD PRIZE, 5*l.*, for his 2 years 4 months-old; bred by himself; sire, "Old Duke."

LORD WALSINGHAM, Merton Hall: the *Reserve Number*, to his 3 years 4 months-old; bred by himself.

Southdowns—Pens of Five Shearling Ewes of the same Flock.

LORD WALSINGHAM, Merton Hall, Thetford, Norfolk: FIRST PRIZE, 15*l.*, for his 1 year 4 months-old; bred by himself.

THE EARL OF RADNOR, Coleshill, Highworth, Wilts: SECOND PRIZE, 10*l.*, for his 1 year 4 months-old; bred by himself.

THE DUKE OF RICHMOND, K.G., Goodwood, Chichester, Sussex: THIRD PRIZE, 5*l.*, for his 1 year 4 months-old; bred by himself.

SIR WILLIAM THROCKMORTON, Bart., Buckland, Faringdon, Berks: the *Reserve Number*, to his 1 year 4 months-old; bred by himself.

Shropshires—Shearling Rams.

JAMES AND EDWARD CRANE, Shrawardine, Shrewsbury: FIRST PRIZE, 20*l.*, for their 1 year 3 months 2 weeks-old; bred by themselves; sire, "Young Celebrity;" sire of dam, "Tern."

THOMAS MANSELL, Adcott Hall, Shrewsbury: SECOND PRIZE, 10*l.*, for his 1 year 4 months 2 weeks-old; bred by himself; sire, "Conservative;" sire of dam, "Maccaroni."

THOMAS MANSELL, Adcott Hall: THIRD PRIZE, 5*l*., for his 1 year 4 months-old; bred by himself; sire, "Conservative;" sire of dam, "Maccaroni."

GEORGE GRIFFITHS, Old Hall, Hanmer, Whitchurch, Shropshire: the *Reserve Number*, to his "Pride of Hanmer," 1 year 3 months 1 week-old; bred by himself; sire, "The Pride of Agden;" sire of dam, "Commonwealth."

Shropshires—Rams of any other Age.

JOHN EVANS, Uffington, Shrewsbury, Salop: FIRST PRIZE, 20*l*., for "Uffington," 2 years 3 months-old; bred by himself; sire, "Nonpareil;" sire of dam, "Emperor."

JAMES AND EDWARD CRANE, Shrawardine, Shrewsbury: SECOND PRIZE, 10*l*., for "Crosswood Hero," 2 years 3 months-old; bred by themselves; sire, "Chieftain;" sire of dam, "Young Tern."

CHARLES BYRD, Lyttywood, Staffordshire: THIRD PRIZE, 5*l*., for "Viceroy," 3 years 4 months 2 weeks-old; bred by Mr. Charles Reynolds Keeling, Yew Tree Farm, Penkridge, Staffordshire; sire, "Grindle;" sire of dam, "Model."

EDWARD HOLLAND, M.P., Dumbleton Hall, Evesham: the *Reserve Number*, to "Royal Ranger," 2 years 4 months 1 week-old; bred by himself; sire, "Ranger;" sire of dam, "Worcester Royal Special."

Shropshires—Pens of Five Shearling Ewes, of the same Flock.

JOHN EVANS, Uffington, Shrewsbury, Salop: FIRST PRIZE, 15*l*., for his 1 year 3 months-old; bred by himself.

LORD CHESHAM, Latimer, Chesham, Buckinghamshire: SECOND PRIZE, 10*l*., for his 1 year 2 months 3 weeks-old; bred by himself.

JOHN COXON, Freeford Farm, Lichfield, Staffordshire: THIRD PRIZE, 5*l*., for his 1 year 3 months 2 weeks-old; bred by himself.

JOSEPH BEACH, The Hattons, Brewood, Staffordshire: the *Reserve Number*, to his 1 year 4 months-old; bred by himself.

Hampshires and other Short Wools—Shearling Rams.

ROBERT AND JOHN RUSSELL, Horton Kirby, Dartford, Kent: FIRST PRIZE, 20*l*., for his 1 year 5 months-old; bred by himself.

STEPHEN KING, Bockhampton Farm, Lambourn, Berkshire: SECOND PRIZE, 10*l*., for his 1 year 4 months 2 weeks-old (West Country); bred by himself.

ROBERT COLES, Middleton, Norton Bavant, Warminster, Wiltshire: THIRD PRIZE, 5*l*., for "Young Victor," 1 year 4 months-old; bred by himself.

JAMES RAWLENCE, Bulbridge, Wilton, Salisbury, Wilts: the *Reserve Number*, to his 1 year 5 months-old (West Country); bred by himself.

Hampshires—Rams of any other Age.

JAMES RAWLENCE, Bulbridge, Wilton, Salisbury, Wilts: FIRST PRIZE, 20*l*., for his 3 years 4 months-old (West Country); bred by himself.

JAMES RAWLENCE, Bulbridge: SECOND PRIZE, 10*l*., for his 3 years 5 months-old (West Country); bred by himself.

ROBERT COLES, Middleton, Norton Bavant, Warminster, Wilts: THIRD PRIZE, 5*l*., for "King Victor," 2 years 4 months-old; bred by himself.

Hampshires—Pens of Five Shearling Ewes of the same Flock.

James Rawlence, Bulbridge: First Prize, 15*l.*, for his 1 year 5 months-old West Country; bred by himself.

James Rawlence, Bulbridge, Wilts: Second Prize, 10*l.*, for his 4 years 5 months-old (West Country); bred by himself.

James Russell, Petham Court, Eynsford, Kent: the *Reserve Number*, to his 1 year 5 months 2 weeks-old; bred by himself.

PIGS.

Boars of a Large White Breed.

Richard Elmhirst Duckering, Northorpe, Kirton-Lindsey: First Prize, 10*l.*, for "Victor 2nd," 2 years 9 months 1 day-old; bred by himself; sire, "Cultivator 1st;" dam, "Countess of Leicester;" sire of dam, "Victor 1st."

James and Frederick Howard, Britannia Farms, Bedfordshire: Second Prize, 5*l.*, for "Victor," 1 year 10 months-old; bred by Mr. Duckering, Kirton-Lindsey, Lincolshire; sire, "Cultivator 3rd;" dam, "Queen Bess."

William Eardley, Larkton Hall, Malpas, Cheshire: the *Reserve Number*, to "Cheshire Lad," 3 years 1 month 1 week 3 days-old; bred by himself; sire, "Hampton;" dam, "Larkton Lass."

Boars of a Small White Breed.

Peter Eden, Cross Lane, Salford, Manchester, Lancashire: First Prize, 10*l.*, for "Lord Nelson," 2 years 6 months-old; bred by Mr. Thomas Crisp, Butley Abbey, Wickham-Market, Suffolk.

William Hatton, Addingham, Leeds, Yorkshire: Second Prize, 5*l.*, for his 1 year 10 months-old; breeder unknown.

Thomas Atherton, Chapel House, Speke, Liverpool: the *Reserve Number*, to his 1 year 9 months-old; bred by himself.

Boars of a Small Black Breed.

George Turner, jun., Alexton Hall, Uppingham: First Prize, 10*l.*, for his 1 year 8 months 2 weeks-old (improved Essex); bred by himself.

Rev. William Holt Beever, Pencraig Court, Ross, Herefordshire: Second Prize, 5*l.*, for "Black Prince 4th," 1 year 10 months-old (Black Suffolk); bred by himself; sire, "Black Prince 1st;" dam, "Black Diamond 4th;" sire of dam, "Black Prince 1st."

William Hemming, Coldicott, Moreton-in-the-Marsh, Gloucestershire: the *Reserve Number*, to his "Master M'Thomas," 1 year 2 months 2 weeks 2 days-old (Suffolk and Essex); bred by himself; sire, "Lord Butley" dam, "Miss Holdway 3rd;" sire of dam, "Ben Macato."

Boars of the Berkshire Breed.

Joseph Smith, Henley-in-Arden, Warwickshire: First Prize, 10*l.*, for "Young Punch," black, with little white, 1 year 2 weeks 2 days-old; bred by himself; sire, "Young Henley;" dam, "Gipsy Queen;" sire of dam, "Sir Walter."

RUSSELL SWANWICK, the Royal Agricultural College Farm, Cirencester, Gloucestershire: SECOND PRIZE, 5*l.*, for "Othello," black and white, 10 months 1 day-old; bred by Captain Stewart, Saint Bridge House, Gloucester; sire, "Sampson;" dam, "British Queen;" sire of dam, "Tim Whiffler."

HEBER HUMFREY, Kingstone Farm, Shrivenham, Berkshire: the *Reserve Number*, to "271 M," black, with little white, 6 months 3 weeks 6 days-old; bred by himself; sire, "Souse Genteel;" dam, "Butter Basket."

Boars of a Breed not eligible for the preceding Classes.

RICHARD ELMHIRST DUCKERING, Northorpe, Kirton-Lindsey, Lincolnshire: FIRST PRIZE, 10*l.*, for "Comet," white, 2 years 7 months-old (middle); bred by himself; sire, "Dreadnought;" dam, "Lily;" sire of dam, "Gaffer Green."

PETER EDEN, Cross Lane, Salford, Manchester: SECOND PRIZE, 5*l.*, for "King Lear 2nd," white, 2 years 1 month 2 weeks 4 days-old (middle); bred by himself; sire, "King Lear;" dam, "Pride of the Village."

WILLIAM HATTON, Addingham, Leeds, Yorkshire: the *Reserve Number*, to "King of the West," white, 4 years 2 months 1 week 2 days-old (middle); bred by Colonel Townley, Burnley, Lancashire.

Breeding Sows of a Large White Breed.

PETER EDEN, Cross Lane, Salford, Manchester: FIRST PRIZE, 10*l.*, for "Lucy," 2 years 3 months-old; bred by Mr. R. Dickin, Lancashire Hill, Stockport, Lancashire; sire, "Victory;" dam, "Gipsy Queen."

RICHARD ELMHIRST DUCKERING, Northorpe, Kirton-Lindsey: SECOND PRIZE, 5*l.*, for "Countess of Leicester," 2 years 3 weeks-old; bred by himself; sire, "Cultivator 2nd;" dam, "Princess Royal;" sire of dam, "Cultivator 1st."

JAMES AND FREDERICK HOWARD, Britannia Farms, Bedford: the *Reserve Number*, to "Miss Kate," in pig, 1 year 4 weeks-old; bred by themselves; sire, "Hero;" dam, "Betsy."

Breeding Sows of a Small White Breed.

WILLIAM HATTON, Addingham: FIRST PRIZE, 10*l.*, for his 1 year 10 months-old; bred by Mr. Thomas Foster, of Bingley.

PETER EDEN, Cross Lane, Salford, Manchester, Lancashire: SECOND PRIZE, 5*l.*, for "Violet," 1 year 10 months 1 week 1 day-old; bred by himself; sire, "King Lear;" dam, "Snowdrop."

THOMAS ATHERTON, Chapel House, Speke, Liverpool: the *Reserve Number*, to his 2 years 8 months-old; bred by Mr. Peter Eden, Salford.

Breeding Sows of a Small Black Breed.

THOMAS CRISP, Butley Abbey: FIRST PRIZE, 10*l.*, for his 2 years 1 month 1 day-old, in pig; bred by himself.

THOMAS ATHERTON, Chapel House, Speke, Liverpool, Lancashire: SECOND PRIZE, 5*l.*, for "Formosa," 1 year 3 days-old, in-pig (Black Suffolk); bred by Mr. G. M. Sexton, Wherstead Hall, Ipswich, Suffolk.

Breeding Sows of the Berkshire Breed.

SIR WILLIAM THROCKMORTON, Bart., Buckland, Faringdon, Berkshire: FIRST PRIZE, 10*l.*, for "Queen," black, with little white, 2 years-old; bred by himself; sire, "Young Champion;" dam, "Favourite;" sire of dam, "Old Champion."

THOMAS CRISP, Butley Abbey: SECOND PRIZE, 5*l.*, for his black and white, 2 years 8 months 1 week-old, in pig; bred by himself.

ARTHUR STEWART, Saint Bridge House: for "Young Sukey," black, with little white, 1 year 3 weeks 5 days-old, in-pig; bred by himself; sire, "Teddy;" dam, "Old Sukey;" sire of dam, "Samson."

RUSSELL SWANWICK, the Royal Agricultural College Farm, Cirencester, Gloucestershire: the *Reserve Number*, to "Young Sally," black and white, 1 year 10 months 3 weeks-old; bred by himself; sire, "2nd Duke of Gloucester;" dam, "Sally the 2nd."

Breeding Sows of a Breed not eligible for the preceding Classes.

PETER EDEN, Cross Lane, Salford, Manchester: FIRST PRIZE, 10*l.*, for his "Queen of Trumps," white, about 3 years-old (middle); bred by Mr. Thomas Foster, Crow-nest, Bingley, Yorkshire; sire, "Cupid."

RICHARD ELMHIRST DUCKERING, Northorpe, Kirton-Lindsey, Lincolnshire: SECOND PRIZE, 5*l.*, for his white, with blue spots, "Primrose," 2 years 9 months 3 days-old (middle); bred by himself; sire, "Victor 1st;" dam, "Lady Byron;" sire of dam, "Cultivator 1st."

WILLIAM HATTON, Addingham, Leeds, Yorkshire: the *Reserve Number*, to his white, 2 years-old, in-pig (middle); bred by himself.

Pens of Three Breeding Sow Pigs of a Large White Breed, of the same Litter, above Four and under Eight Months old.

MATTHEW WALKER, Stockley Park: FIRST PRIZE, 10*l.*, for "Tulip," "Snowdrop," and "Crocus," 7 months 3 weeks 2 days-old; bred by himself; sire, "Robin Hood;" dam, "Marian;" sire of dam, "Wainman."

RICHARD ELMHIRST DUCKERING, Northorpe: SECOND PRIZE, 5*l.*, for "Rose," "Shamrock," and "Thistle," 7 months 3 weeks 6 days-old; bred by himself; sire, "Cultivator 3rd;" dam, "Princess Royal;" sire of dam, "Cultivator 1st."

GEORGE CHAPMAN, Seamere, Yorkshire: the *Reserve Number*, to his 7 months 1 week 6 days-old; bred by himself; sire, "Fair Play;" dam, "Nancy."

Pens of Three Breeding Sow Pigs of a Small White Breed, of the same Litter, above Four and under Eight Months old.

EARL OF RADNOR, Coleshill, Highworth, Wiltshire: FIRST PRIZE, 10*l.*, for his 8 months-old (Coleshill); bred by himself; sire, "Lavington;" dam, "D."

HUGH AYLMER, West Dereham Abbey, Stoke Ferry, Norfolk: SECOND PRIZE, 5*l.*, for his 7 months 2 weeks-old; bred by himself; sire, "Perfect Cure;" dam, "Lucky Link;" sire of dam, "Butley Hero."

LORD WENLOCK, Escrick Park, Yorkshire: the *Reserve Number*, to his 6 months 1 week 3 days-old; bred by himself; sire, "Chance 2nd;" dam, "Lily."

Pens of Three Breeding Sow Pigs of the Berkshire Breed, of the same Litter, above Four and under Eight Months old.

JOSEPH SMITH, Henley-in-Arden, Warwickshire: FIRST PRIZE, 10*l.*, for his black and white, 7 months 3 weeks 5 days-old, bred by himself; sire, "Young Henley;" dam, "Lady Birmingham."

HEBER HUMFREY, Kingstone Farm, Shrivenham, Berkshire: SECOND PRIZE, 5*l.*, for his "271 A, B," and "C," black, with little white, 6 months 3 weeks 1 day-old, bred by himself; sire, "Souse Genteel;" dam, "Butter Basket."

HEBER HUMFREY, Kingstone Farm: the *Reserve Number*, to his "271 D, E," and "F," black, with little white, 6 months 3 weeks 6 days old; bred by himself; sire, "Souse Genteel;" dam, "Butter Basket."

Pens of Three Breeding Sow Pigs of a Breed not eligible for the preceding Classes, of the same Litter, above Four and under Eight months old.

GEORGE CHAPMAN, Seamere, Yorkshire: FIRST PRIZE, 10*l*., for his white and blue, 7 months 2 weeks-old (middle); bred by himself; sire, "Fair Play;" dam, "Seamere Pride."

RICHARD ELMHIRST DUCKERING, Northorpe, Kirton-Lindsey: SECOND PRIZE, 5*l*., for "Faith," "Hope," and "Charity," 7 months 2 weeks 1 day-old (middle), white; bred by himself; sire, "Dreadnought;" dam, "Lady Biron;" sire of dam, "Cultivator 1st."

WOOL.

**Six Long-Woolled Hog Fleeces.*

CHRISTOPHER BARROBY, Baldersby, Thirsk, Yorkshire: FIRST PRIZE, 10*l*., for his Leicesters, grown by himself.

CHARLES BOSWORTH, Dishley, Loughborough, Leicestershire: SECOND PRIZE, 2*l*., for his Leicesters, grown by himself.

BUTTER.

**Six Pounds of Fresh Butter, in One Pound Lumps.*

The AGRICULTURAL COLONY, Coalville, Leicester: FIRST PRIZE, 5*l*.
The Rev. GEORGY W. STRATON, of Aylestone Rectory, Leicester: SECOND PRIZE, 2*l*.

CHEESE.

SPECIAL PRIZES OFFERED BY THE SPARKENHOE FARMERS' CLUB.

For the Best Six Cheeses exceeding 45lbs. each.

FRANCIS SPENCER, Claybrook Magna, Lutterworth, Leicestershire: FIRST PRIZE, 10*l*.

WILLIAM NEAL BERRY, Stoke Golding, Hinckley, Leicestershire: SECOND PRIZE, 7*l*.

TOM CATTELL, Bitteswell Field, Lutterworth: THIRD PRIZE, 3*l*.

For the Best Six Cheeses exceeding 35lbs. each, but not more than 45lbs.

SAMUEL WYKES, Aston Flamville, Hinckley: FIRST PRIZE, 10*l*.

WILLIAM TRIVETT, Market Bosworth, Leicestershire: SECOND PRIZE, 7*l.*

WILLIAM NUTTALL, South Croxton, Leicestershire: THIRD PRIZE, 3*l.*

For the Best Six Cheeses not exceeding 36*lbs. each.*

WILLIAM WARD, Attleborough Gorse, Nuneaton, Warwickshire: FIRST PRIZE, 10*l.*

SAMUEL C. PILGRIM, Out-Woods, Burbage, Hinckley: SECOND PRIZE, 7*l.*

JOHN HARDING, Atterton, Nuneaton: THIRD PRIZE, 3*l.*

For the Best Entry in the above Classes.

SAMUEL WYKES, of Aston Flamville, Hinckley: the PRIZE of 15*l.*

To the Dairymaid or Servant who has manufactured the best Entry.

The Dairymaid of SAMUEL WYKES, Aston Flamville, Hinckley: the PRIZE of 5*l.*

For the Best Six Stilton Cheeses.

EZRA PEEL SMITH, New Parks, Leicester: FIRST PRIZE, 10*l.*

THOMAS M. EVANS and JOHN STAFFORD, Campbell Street, Leicester: SECOND PRIZE, 7*l.*

WILLIAM STANNAGE, of Twyford, Melton Mowbray: THIRD PRIZE, 3*l.*

IMPLEMENTS.

STEAM CULTIVATION.

JOHN FOWLER and Co., 71, Cornhill, London, and Steam-Plough Works, Leeds: the GOLD CUP, offered by his Highness the Viceroy of Egypt, "For their 10-Horse Power Double Set of Hauling Apparatus, invented and manufactured by themselves, being the best Implement for the Cultivation of the Soil by Steam-Power, combining strength with simplicity of construction, for use in foreign countries where skilled labour for repairs is difficult to be procured."

JOHN FOWLER and Co.: FIRST PRIZE, 100*l.*, for their 10-Horse Power Double Set of Hauling Apparatus, invented and manufactured by themselves.

JOHN FOWLER and Co.: SECOND PRIZE, 25*l.*, for their 10-Horse Power Single Set of Hauling Apparatus, invented and manufactured by themselves.

JOHN FOWLER and Co.: SECOND PRIZE, 25*l.*, for their 8-Horse Power Single Set of Hauling Apparatus, invented and manufactured by themselves.

JAMES and FREDERICK HOWARD, Britannia Works, Bedford: the FIRST PRIZE, 50*l.*, for their Set of Patent Steam-Cultivating Apparatus, invented, improved, and manufactured by themselves.

JOHN FOWLER and Co.: the PRIZE of 12*l.*, for their 4-Furrow Patent Balance Plough: invented and manufactured by themselves.

JOHN FOWLER and Co.: the Prize of 12*l.*, for their 7-Tine Patent Balance Cultivators for large occupations: invented and manufactured by themselves.

James and Frederick Howard: the Prize of 12*l.*, for their 5-Tined Cultivator for small occupations; invented, improved, and manufactured by themselves.

John Fowler and Co.: the Prize of 15*l.*, for their new Patent Light Land Cultivator: invented and manufactured by themselves.

John Fowler and Co.: the Prize of 8*l.*, for their Frame for Harrows, Rollers, &c.; invented and manufactured by themselves.

James and Frederick Howard: the Prize of 7*l.*, for their Patent Steam Harrows; invented and manufactured by themselves.

John Fowler and Co.: the Prize of 10*l.*, for their Disc-Travelling Anchors: invented and manufactured by themselves.

John Fowler and Co.: the Prize of 8*l.*, for their Double-Drum Windlass on Engine; invented and manufactured by themselves.

John Fowler and Co.; the Prize of 8*l.*, for their Clip-Drum Windlass on Engine; invented and manufactured by themselves.

James and Frederick Howard: the Prize of 8*l.*, for their Double-Drum Windlass on Frame: invented and manufactured by themselves.

John Fowler and Co.: Highly Commended for their 3-Furrow Patent Balance French Plough, fitted with Kent Breasts, invented and manufactured by themselves.

James and Frederick Howard: Highly Commended for their Patent 2-Furrow Steam Plough, invented and manufactured by themselves.

Ploughs.

James and Frederick Howard: the First Prize of 9*l.*, for their Patent Iron Wheel Plough for General Purposes, invented and manufactured by themselves.

Ransomes and Sims, Orwell Works, Ipswich: Second Prize 5*l.*, for their Iron Beam Plough with 2 wheels, for General Purposes, invented and manufactured by themselves.

James and Frederick Howard: the First Prize of 6*l.*, for their Patent Iron Light Land Wheel Plough, invented and manufactured by themselves.

Ransomes and Sims: the Second Prize, 4*l.*, for their Iron Light Land 2-Wheel Beam Plough, invented and manufactured by themselves.

Ransomes and Sims: the Prize of 6*l.*, for their Iron Deep Land Beam Plough, invented and manufactured by themselves.

James and Frederick Howard: the First Prize of 8*l.*, for their General Purpose Patent Iron Swing Plough; invented and manufactured by themselves.

Ransomes and Sims: the Second Prize of 4*l.*, for their General Purpose Iron Beam Swing Plough; invented and manufactured by themselves.

James and Frederick Howard: the First Prize of 5*l.*, for their Light Land Patent Iron Swing Plough; invented and manufactured by themselves.

Ransomes and Sims: the Second Prize of 3*l.*, for their Light Land Iron Beam-Swing Plough: invented and manufactured by themselves.

James and Frederick Howard: the First Prize, of 6*l.*, for their Double Subsoil Plough: invented and manufactured by themselves.

Ransomes and Sims: the Second Prize of 4*l.*, for their New Iron Ridging or Subsoil Plough, 2 wheels: invented and manufactured by themselves.

Ransomes and Sims: the First Prize, of 6*l.*, for their Paring Plough, 2 wheels, invented and manufactured by themselves.

James and Frederick Howard: the Second Prize, of 4*l.*, for their Paring Plough; invented and manufactured by themselves.

Ransomes and Sims: Silver Medal, for their Turn Wrest Plough, with patent wheels; invented by J. Skelton, Lostwithiel, improved and manufactured by themselves.

Richard Hornsby and Sons, Spittlegate Works, Grantham: Highly Commended for their General Purpose Wheel Plough; invented and manufactured by themselves.

Richard Hornsby and Sons: Highly Commended for their Light Land Wheel Plough; invented and manufactured by themselves.

John Cooke and Co., Lincoln: Highly Commended for their Deep Land Wheel Plough; invented and manufactured by themselves.

William Ball and Son, Rothwell, Kettering: Highly Commended for their Paring Plough; invented and manufactured by themselves.

Richard Hornsby and Sons: Highly Commended for their Digging Plough: invented and manufactured by themselves.

James and Frederick Howard: Highly Commended for their Digging Plough; invented and manufactured by themselves.

Ransomes and Sims: Highly Commended for their Digging Plough; invented and manufactured by themselves.

John Cooke and Co.: Commended for their General Purpose Swing Plough; invented and manufactured by themselves.

Richard Hornsby and Sons: Commended for their General Purpose Swing Plough; invented and manufactured by themselves.

William Ball and Son: Commended for their General Purpose Plough; invented and manufactured by themselves.

Richard Hornsby and Sons: Commended for their Light Land Swing Plough; invented and manufactured by themselves.

Richard Hornsby and Sons: Commended for their Wheel Plough for deep cultivation: invented, and manufactured by themselves.

Cultivators.

Edward Hammond Bentall, Heybridge, Maldon, Essex: First Prize, 13*l.*, for his Broadshare and Cultivator; invented and manufactured by himself.

Charles Clay, the Stennard Works, Wakefield: Second Prize, 7*l.*, for his Cultivator; invented and manufactured by himself.

Hunt and Pickering, Leicester: Highly Commended for their 5-Tine Cultivator; invented and manufactured by themselves.

Clodcrushers.

The Beverley Iron and Waggon Company (Limited), Beverley, Yorkshire; First Prize, 11*l.*, for their Clodcrusher with self-cleaning action, improved and manufactured by themselves.

AMIES, BARFORD, and Co., Queen-street, Northampton: SECOND PRIZE, 9*l.*, for their Clodcrusher for Horse or Steam-power; invented and manufactured by themselves.

WILLIAM CROSSKILL and SONS, Beverley: HIGHLY COMMENDED for their Clodcrusher: invented by W. Crosskill, improved and manufactured by themselves.

ROLLERS.

AMIES, BARFORD, and Co.: FIRST PRIZE, 6*l.*, for their Wrought-iron Adjustable Water Ballast Roller; invented and manufactured by themselves.

The BEVERLEY IRON and WAGGON COMPANY (Limited): SECOND PRIZE, 4*l.*, for their Plain Field Roller; improved and manufactured by themselves.

AMIES and BARFORD: HIGHLY COMMENDED for their Wrought-iron 3-Cylinder Roller: invented and manufactured by themselves.

HARROWS.

JAMES and FREDERICK HOWARD: FIRST PRIZE 13*l.*, for their 4-Beam Jointed Iron Harrows, invented and manufactured by themselves.

RANSOMES and SIMS: SECOND PRIZE, 7*l.*, for their Heavy Jointed Harrows: invented and manufactured by themselves.

ASHBY and JEFFREY, Stamford, Lincolnshire; HIGHLY COMMENDED for their Pair of Rotating Harrows for two horses; invented and manufactured by themselves.

WALTER F. JOHNSON, Leicester: HIGHLY COMMENDED for his Set of Drag Harrows; invented, improved, and manufactured by T. Perkins, Hitchin.

HENRY DENTON, Wolverhampton: HIGHLY COMMENDED for his Adjustable Chain Harrow, with carriage; invented and manufactured by himself.

HOLMES and SONS, Prospect Place, Norwich: HIGHLY COMMENDED for their new Rotary Harrow or Twitch Extirpator: invented by T. Everett, Creake, improved and manufactured by themselves.

CAMBRIDGE and Co., St. Philip's Works, Bristol: COMMENDED for their Notched-Wheel Roller and Clodcrusher: invented by W. C. Cambridge, improved and manufactured by themselves.

WILLIAM LEWIS, Salopian Works, Shrewsbury: COMMENDED for his Cast-iron Land Roll, invented and manufactured by himself.

HOLMES and SONS: COMMENDED for their Wrought-iron Land Roller; manufactured by themselves.

E. CAMBRIDGE and Co.: COMMENDED for their Tine and Chain Harrow, invented by W. C. Cambridge, improved and manufactured by themselves.

TILE AND BRICK MACHINES.

JOHN WHITEHEAD, Albert Works, Preston, Lancashire: FIRST PRIZE, 7*l.* 10*s.*, for his Solid Brick-making Machine; invented, improved, and manufactured by himself.

JOHN WHITEHEAD: FIRST PRIZE, 7*l.* 10*s.*, for his Double Box Steam-power Drain-pipe, Tile, and Brick-making Machine; invented and manufactured by himself.

J. D. PINFOLD, Worcestershire Works, Rugby: SECOND PRIZE, 5*l.*, for his Brick and Tile-making Machine, invented and manufactured by himself.

Draining Tools.

Hunt and Pickering: Silver Medal, for their collection of Solid Cast Steel Shovels and Draining Tools; manufactured by W. Hunt and Son.

MISCELLANEOUS.

James and Frederick Howard: Silver Medal, for their Twenty-horse-power Safety Steam-Boiler and Superheater; invented and manufactured by themselves.

Amies, Barford, and Co.: Silver Medal, for their Press-Wheel Roller and Clodcrusher; invented and manufactured by themselves.

Amies, Barford, and Co.: Silver Medal, for their Combined Straw, Corn, and Hay Stacking Machine; invented and manufactured by themselves.

The Beverley Iron and Waggon Company (Limited): Silver Medal, for their pair of Patent Iron Wheels, with Patent Axle and Oil-Boxes; invented and manufactured by themselves.

Bryan Corcoran and Co., 48, Mark Lane, London: Silver Medal, for their Diamond Millstone Dressing Machine; invented by Golay, Switzerland; manufactured by Mather and Son, Edinburgh.

James Lee Norton, 38, Belle Sauvage Yard, Ludgate Hill, London: Silver Medal, for his Patent Tube Well and Pump; invented and manufactured by himself.

James Lee Norton: Silver Medal, for his Patent Revolving Archimedian Screw Ventilator; invented by John Howarth, Farnworth, Manchester.

Clayton, Shuttleworth, and Co., Lincoln: Silver Medal, for their Patent Combined, Two-row Revolving Liquid Manure and Drop Drill; invented by J. C. Gillyatt; improved and manufactured by themselves.

H. R. Marsden: Silver Medal, for his Patent Stone Breaker; invented by E. W. Blake, United States; improved and manufactured by himself,

William Smith, Kettering: Commended for his improved Grindstone Frame; invented and manufactured by himself.

James and George Haywood, Derby: Commended for their Chaff-Cutter, with Leather Strap and Pulleys; invented and manufactured by themselves.

W. Coleman and Peter Love, Northampton: Commended for their Round Combined Bin and Trough, and for their Long Combined Bin, Trough, and Hay Rack; invented and manufactured by Peter Love.

Aveling and Porter, Rochester: Commended for their Patent Locomotive Crane Engine; invented by T. Aveling: manufactured by themselves.

Essays and Reports.

AWARD FOR 1868.

Class X.

The Prize of 20*l.* was awarded to Mr. Henry Hall Dixon, 8, Warwick Gardens, Kensington, for his Essay on the Leicester Breed of Sheep.

EDUCATION COMMITTEE.

Examination Papers, 1868.

QUESTIONS ON PRACTICAL AGRICULTURE.

Time allowed for answering these Questions, 9 A.M., *to* 1 P.M.

No. 1. On a farm of 1000 acres of arable land of mixed character of soil; light, moderate clay, and loam—but on all of which roots, such as turnips, mangold, &c., can be advantageously grown—state the number of acres which should be under cultivation for roots per annum, and the proportion of each description—also what description of root is best adapted for and should be planted on each kind of soil.

No. 2. Suppose a piece of 10 acres of swedes, the weight of which is estimated at 14 tons per acre. How many young sheep (commonly called tegs) would be required to consume the swedes on the whole piece in a month, presuming the sheep had only chaff with them, and also presuming that each sheep had half a pound of cake or corn per day?

No. 3. Taking a farm as described in No. 1 question. What will be the horse-power required for 100 acres for its proper cultivation? How much of that power may be dispensed with by the introduction of Fowler's double-engine steam plough (12 horse-power each engine)? Give a detailed description of the cultivation for a root crop, commencing from the time that the previous corn crop has been carried from the land in course for roots to the time of such land being prepared and ready for the turnip drill the following spring. (1) If performed with horse-power; (2) If performed with steam-power and horse-power combined.

No. 4. Describe the best method of planting potatoes, the quantity of seed required per acre, the selection of such seed and whether to be planted whole, or, if cut, how?—and, the after cultivation.

No. 5. How often should farmyard manure be applied to arable land, for what crops—in what state—at what time of year—what quantity at a time? State also whether all descriptions of soil should be treated alike with regard to manuring: if not, state the principal differences.

No. 6. Describe the best method of draining tenacious clay soils with high-ridged lands, comparatively porous soils, and also wet and, as it is called, *springy* gravel or other soil, giving depth, width between drain, and cost per acre, presuming daily wages to be 2*s*. and that no hard rock has to be cut through.

No. 7. What is the best method of improving grass land, such land being moderately poor clay?

No. 8. Supposing grass land worth 50*s*. an acre to rent, how much stock per acre ought it to graze through the year, and what sorts?

No. 9. Give a description of the points to be observed in selecting cattle for grazing, and state also what character of cattle should be selected for stocking land, the grass from which is not rich enough to feed grazing stock.

No. 10. What would be the probable weight of a cubic yard of English hay which had been well made and grown on land worth 50*s*. an acre to rent?

No. 11. State the course of cropping to be pursued on a farm of strong land adapted for wheat and beans—but on which, from its cold nature, roots could only be consumed on the land in early autumn and late spring.

No. 12. Taking a farm as described in No. 1 question. State the principal implements required and the number of each (1) presuming horse-power only employed (2), presuming steam-power employed as well.

No. 13. Taking a farm as described in No. 1 question—with the addition of 100 acres of grass land,—give a detailed account of the management of breeding ewes on such a farm from September to lambing time, and from that time to the time of weaning the lambs.

No. 14. Taking a farm as described in No. 1 question, such farm having with it 100 acres of grass, what number of cattle, sheep, and pigs would be required to stock it?

No. 15. Give a detailed account of the work to be done in thrashing a rick of wheat with a six-horse-power steam thrashing machine one mile from the farmstead; what number of hands would be required, their several duties, and the number of horses required to cart straw and corn to the farmstead and barn.

QUESTIONS IN CHEMISTRY.

Time allowed for answering these Questions, 2 P.M., *to* 4 P.M.

No. 1. Describe the process of preparing sulphuric acid as usually carried on in this country, and explain the chemistry of it. Show how to ascertain (1) the degree of dilution of a sample, (2) whether it contains lead (3) whether it contains arsenic.

No. 2. Give an account of the chief properties of the element carbon. Give some explanation of the action of charcoal filters, stating the experimental facts on which your explanation is based.

No. 3. What is the formula for ammonia? Show how the nature and the relative proportions of the constituents are demonstrated. Explain what are meant by derivatives from ammonia by substitution, giving one or more examples of such compounds and indicating by equations how they are obtained.

No. 4. Explain the effects of burning on the chemical constitution of soils; and point out the precautions (from a chemical point of view) which must be taken in applying this agency and the reasons for them.

No. 5. In what combinations occur usually the following elements in soils; P., S., K., Na., Si., Ca., Mg.

No. 6. Describe in general terms what takes place when the following liquids percolate through a fertile soil:—

Solutions of Nitrate of Soda.
" Sulphate of Ammonia.
" Chloride of Potassium.
" Chloride of Sodium.
" Superphosphate of Lime.
Town Sewage.

No. 7. Describe the chemical properties of the chief constituents of milk, and a good plan of analysing milk.

No. 8. How would you proceed in determining the nutritive value of new articles of food, such as palm-nut meal, foreign grains, feeding cakes, &c.

QUESTIONS IN MECHANICS.

Time allowed for answering these Questions, 10 A.M., *to* 1 P.M.

No. 1. A rope from a windlass, having a strain of 2640 lbs. upon it, passes along a headland and round a pulley, drawing a steam plough across a field; the direction of the plough is at right angles to the headland.

Required the strain in lbs. on the shank of the anchor which keeps the pulley in position.

Also give the method of finding it in the case of any angle other than a right angle, and work it where the direction of the plough is 45 degrees to the headland.

No. 2. The diameter of the safety-valve of a steam boiler is 2½ inches, the length of the lever from the centre of the fulcrum to that of the weight is 26 inches and the distance of the centre of the fulcrum from that of the valve is 3½ inches; the weight applied to the lever is 20 lbs.

Required the pressure per square inch in the boiler to be in equilibrium with the weight on the valve.

No. 3. A loaded cart weighs 5000 lbs.; the diameter of the wheels is 4 ft. 9 in. The cart has to be drawn into a barn over a threshold 3½ inches high.

Required the force in lbs. to draw the cart over the threshold, friction excluded.

No. 4. A wagon is laden with hops, the width of the wheels to the outside of the tires is 5 feet, the load has shifted and the centre of gravity is found in a line at 2 feet within the outside of the near side wheels, and at a height of 9 feet above the ground.

Required the difference in level of a road or of a hill-side when the whole would be in equilibrium and just on the point of upsetting.

No. 5. The drum of a threshing machine makes 1000 revolutions per minute, its diameter is 22 inches, and the weight of one of its beaters is 17½ lbs.

Required the force in lbs. necessary to hold the beater in its position on the drum.

No. 6. There is a "draw-well," fitted with a windlass, rope, and bucket, the depth of the well to the water is 100 feet, the bucket filled with water weighs 110 lbs.; the rope is elastic, and it will stretch 10 feet before the tension will lift the bucket.

Required the units of work to be done in raising the bucket through the space of 100 feet, exclusive of friction and the weight of the rope.

N.B.—The unit equals 1 lb. weight, raised one foot high.

No. 7. A fir pole is 65 feet long, rests upon a support at each end; its diameter at one end is 9 inches, at the other 6 inches; its specific gravity is ·652.

Required the weight in lbs. upon each of the supports, also the distance of the centre of gravity from either end of the pole.

No. 8. There is a stream of water passing through a farm with a fall of 6 feet; it is desirable to apply the power and to obtain a force of 330,000 units of work per minute.

(1) What, in your opinion, would be the best description of wheel to employ?

(2) What should be the diameter, the width, and the velocity of the wheel at the periphery?

(3) What should be the depth of the float-boards or buckets?

QUESTIONS IN BOTANY.

Time allowed for answering these Questions, 2 P.M. *to* 4. P.M.

No. 1. Distinguish between a parasite and an epiphyte; and mention the parasitical flowering plants which are injurious to our growing crops, giving the name of each parasite with the plant it commonly attacks.

No. 2. Define a root, stem, tuber, corm, bulb and rhizome.

No. 3. Mention the natural order to which the common coltsfoot and dandelion belong, and describe and contrast their respective flower-heads.

No. 4. Give the botanical names and natural orders of the following plants:—

(1) rape, (2) lucerne, (3) saintfoin, (4) parsnip, (5) buckwheat, (6) sorghum.

No. 5. Describe the inflorescence of the common wheat, barley, oats, and rye, noting especially the characters which distinguish them from one another.

No. 6. Refer the four plants marked A, B, C, and D, to their respective natural orders, *stating the reasons* why they are so referred.

No. 7. Describe the plant A briefly in English technical language, noticing the organs in their proper sequence.

QUESTIONS IN GEOLOGY.

Time allowed for answering these Questions, 9 A.M. *to* 11 A.M.

No. 1. Upon what principles are the stratified rocks classified?

No. 2. Name the fossils which especially characterise the three great divisions of the fossiliferous rocks.

No. 3. Give the geological formations in which coprolites, and other aggregations of phosphatic matter, have been found.

No. 4. Arrange in the order of superposition the chief divisions of the cretaceous system, pointing out their mineral characters, and the nature of the soils derived from each by disintegration.

No. 5. Define the terms marl, chalk, loam, shale, slate, pan, travertine, and mould, and explain their origin.

No. 6. Give the geological position of the Wenlock, Lias, Aymestry, magnesian, and carboniferous limestones, stating the formations immediately above and below each.

No. 7. Explain the meaning of outcrop, dip, strike, and unconformability of strata, and give illustrative diagrams.

No. 8. Give the composition of rock-salt, gypsum, and alum-shale, and name the geological formations in which these substances are usually sought for in England.

No. 9. In what counties in England and Wales are the following systems respectively found at the surface: silurian, carboniferous, permian, triassic, and oolitic?

No. 10. How may the "boulder clay" be distinguished from clays of older geological age?

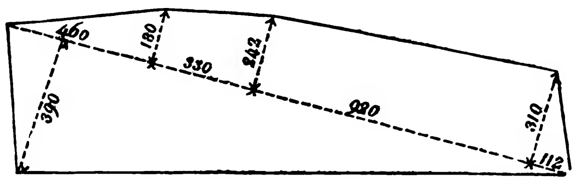
No. 11. Explain the meaning of the terms "permeable" and "impermeable" strata, and point out their respective influence on the overlying soils.

No. 12. What districts of England are especially characterized by strata of Eocene age?

QUESTIONS IN LAND-SURVEYING.

Time allowed for answering these Questions, 2 P.M. *to* 4 P.M.

No. 1. Explain the object of land-measuring and also of land-surveying. In illustration of your remarks calculate the acreage of the field shown on the adjoining sketch and state whether you consider the measurements on the sketch are sufficient to give an accurate survey of the field, and if not, show how you would survey it.



NOTE.—The dimensions given are in links, and the offsets are set off perpendicular to the main line by the cross staff.

No. 2. Given a rectangular field of 10 acres, 3 acres of which is intended to be planted with mangel wurtzel, and the other 7 acres with swedish turnips. Sketch the field and show how you would divide the 3 acres from the other 7.

No. 3. How would you measure across a river 30 yards wide in chaining a main line.

No. 4. A field was measured on a plan which was supposed to be on the scale of 3 chains to an inch, and the area was found to be 12a. 2r. 25p. It was subsequently discovered that the scale of the plan was really 4 chains to an inch. What is the true area of the field?

No. 5. If 5 heaps are made from a load of manure, and the heaps six yards from centre of one heap to centre of next, how many loads will be required to manure a field of 20 acres, supposing the rows to be 12 yards apart?

No. 6. Describe how you would ascertain the difference in level between two points with a spirit level. (1) When the points can both be seen from one position of the level. (2) When the points cannot both be so seen; and illustrate your remarks with a sketch. Also describe any other method by which you could ascertain the rise and fall of land for the purpose of cutting a drain to dry a pond.

MEMORANDA.

ADDRESS OF LETTERS.—The Society's office being situated in the postal district designated by the letter W, members, in their correspondence with the Secretary, are requested to subjoin that letter to the usual address.

GENERAL MEETING in London, in December, 1868.

GENERAL MEETING in London, May 22nd, 1869, at Twelve o'clock.

MEETING at Manchester, in July, 1869.

MONTHLY COUNCIL (for transaction of business), at 12 o'clock on the first Wednesday in every month, excepting January, September, and October: open only to Members of Council and Governors of the Society.

WEEKLY COUNCIL (for practical communications), at 12 o'clock on all Wednesdays in February, March, April, May, June, July, and November, excepting the first Wednesday in each of those months, and during adjournment: open to all Members of the Society, who are particularly invited by the Council to avail themselves of this privilege.

ADJOURNMENTS.—The Council adjourn over Passion and Easter weeks, when those weeks do not include the first Wednesday of the month; from the first Wednesday in August to the first Wednesday in November; and from the first Wednesday in December to the first Wednesday in February.

DISEASES of Cattle, Sheep, and Pigs.—Members have the privilege of applying to the Veterinary Committee of the Society; and of sending animals to the Royal Veterinary College, on the same terms as if they were subscribers to the College.—(A statement of these privileges will be found in the present Appendix.)

CHEMICAL ANALYSIS.—The privileges of Chemical Analysis enjoyed by Members of the Society will be found stated in the Appendix of the present volume.

LOCAL CHEQUES.—Members are particularly requested not to forward Country Cheques for payment in London; but London Cheques, or Post-office Orders on Vere-street (payable to H. HALL DARE), in lieu of them. All Cheques are required to bear upon them a penny draft or receipt stamp, which must be cancelled in each case by the initials of the drawer. They may also conveniently transmit their Subscriptions to the Society, by requesting their Country Bankers to pay (through their London Agents) the amount at the Society's Office (No. 12, Hanover Square, London), between the hours of ten and four, when official receipts, signed by the Secretary, will be given for such payments.

NEW MEMBERS.—Every candidate for admission into the Society must be proposed by a Member; the proposer to specifiy in writing the full name, usual place of residence, and post-town, of the candidate, either at a Council meeting, or by letter addressed to the Secretary.

PACKETS BY POST.—Packets not exceeding two feet in length, width, or depth, consisting of written or printed matter (but not containing letters sealed or open), if sent without envelopes, or enclosed in envelopes open at each end, may be forwarded by the inland post, if stamped, at the following rates:— One Penny for every quarter of a pound or fraction of a quarter of a pound.

*** Members may obtain on application to the Secretary copies of an Abstract of the Charter and Bye-Laws, of a Statement of the General Objects, &c., of the Society, of Chemical and Veterinary Privileges, and of other printed papers connected with special departments of the Society's business.

Members' Privileges of Chemical Analysis.

THE Council have fixed the following rates of Charge for Analyses to be made by the Consulting Chemist for the *bonâ-fide* use of Members of the Society; who (to avoid all unnecessary correspondence) are particularly requested, when applying to him, to mention the kind of analysis they require, and to quote its number in the subjoined schedule. The charge for analysis, together with the carriage of the specimens, must be paid to him by members at the time of their application.

No. 1.—An opinion of the genuineness of Peruvian guano, bone-dust, or oil-cake (each sample) .. .. 5*s*.
„ 2.—An analysis of guano; showing the proportion of moisture, organic matter, sand, phosphate of lime, alkaline salts, and ammonia .. .. 10*s*.
„ 3.—An estimate of the value (relatively to the average of samples in the market) of sulphate and muriate of ammonia, and of the nitrates of potash and soda .. .. 10*s*.
„ 4.—An analysis of superphosphate of lime for soluble phosphates only .. .. 10*s*.
„ 5.—An analysis of superphosphate of lime, showing the proportions of moisture, organic matter, sand, soluble and insoluble phosphates, sulphate of lime, and ammonia .. £1.
„ 6.—An analysis (sufficient for the determination of its agricultural value) of any ordinary artificial manure .. .. £1.
„ 7.—Limestone:—the proportion of lime, 7*s*. 6*d*.; the proportion of magnesia, 10*s*.; the proportion of lime and magnesia .. .. 15*s*.
„ 8.—Limestone or marls, including carbonate, phosphate, and sulphate of lime, and magnesia with sand and clay .. £1.
„ 9.—Partial analysis of a soil, including determinations of clay, sand, organic matter, and carbonate of lime .. .. £1.
„ 10.—Complete analysis of a soil .. .. £3.
„ 11.—An analysis of oil-cake, or other substance used for feeding purposes; showing the proportion of moisture, oil, mineral matter, albuminous matter, and woody fibre; as well as of starch, gum, and sugar, in the aggregate £1.
„ 12.—Analyses of any vegetable product .. .. £1.
„ 13.—Analyses of animal products, refuse substances used for manure, &c. .. .. from 10*s*. to 30*s*.
„ 14.—Determination of the "hardness" of a sample of water before and after boiling .. .. 10*s*.
„ 15.—Analysis of water of land drainage, and of water used for irrigation .. .. £2.
„ 16.—Determination of nitric acid in a sample of water .. .. £1.

N.B.—*The above Scale of Charges is not applicable to the case of persons commercially engaged in the Manufacture or Sale of any Substance sent for Analysis.*

The Address of the Consulting Chemist of the Society is, Dr. AUGUSTUS VOELCKER, 11, Salisbury Square, London, E.C., to which he requests that all letters and parcels (postage and carriage paid) should be directed.

Members' Veterinary Privileges.

I.—Serious or Extensive Diseases.

No. 1. Any Member of the Society who may desire professional attendance and special advice in cases of serious or extensive disease among his cattle, sheep, or pigs, and will address a letter to the Secretary, will, by return of post, receive a reply stating whether it be considered necessary that Professor Simonds, the Society's Veterinary Inspector, should visit the place where the disease prevails.

No. 2. The remuneration of the Inspector will be 2*l.* 2*s.* each day as a professional fee, and 1*l.* 1*s.* each day for personal expenses; and he will also be allowed to charge the cost of travelling to and from the locality where his services may have been required. The fees will be paid by the Society, but the travelling expenses will be a charge against the applicant. This charge may, however, be reduced or remitted altogether at the discretion of the Council, on such step being recommended to them by the Veterinary Committee.

No. 3. The Inspector, on his return from visiting the diseased stock, will report to the Committee, in writing, the results of his observations and proceedings, which Report will be laid before the Council.

No. 4. When contingencies arise to prevent a personal discharge of the duties confided to the Inspector, he may, subject to the approval of the Committee, name some competent professional person to act in his stead, who shall receive the same rates of remuneration.

II.—Ordinary or Other Cases of Disease.

Members may obtain the attendance of the Veterinary Inspector on any case of disease by paying the cost of his visit, which will be at the following rate, viz., 2*l.* 2*s.* per diem, and travelling expenses.

III.—Consultations without Visit.

Personal consultation with Veterinary Inspector	5*s.*
Consultation by letter	5*s.*
Consultation necessitating the writing of three or more letters.	10*s.*
Post-mortem examination, and report thereon	10*s.*

A return of the number of applications during each half-year being required from the Veterinary Inspector.

IV.—Admission of Diseased Animals to the Veterinary College; Investigations, Lectures, and Reports.

No. 1. All Members of the Society have the privilege of sending cattle, sheep, and pigs to the Infirmary of the Royal Veterinary College, on the same terms as if they were Members of the College; viz., by paying for the keep and treatment of cattle 10*s.* 6*d.* per week each animal, and for sheep and pigs "a small proportionate charge to be fixed by the Principal according to circumstances."

No. 2. The College has also undertaken to investigate such particular classes of disease, or special subjects connected with the application of the Veterinary art to cattle, sheep, and pigs, as may be directed by the Council.

No. 3. In addition to the increased number of lectures now given by Professor Simonds—the Lecturer on Cattle Pathology—to the pupils in the Royal Veterinary College, he will also deliver such lectures before the Members of the Society, at their house in Hanover Square, as the Council shall decide.

No. 4. The Royal Veterinary College will from time to time furnish to the Council a detailed Report of the cases of cattle, sheep, and pigs treated in the Infirmary.

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OF THE

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

1868.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

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†Hamilton, Right Hon. R. A. Nisbet-...Bloxholme Hall, Sleaford, Lincolnshire
Hamond, Anthony...Westacre Hall, Brandon, Norfolk
†Harcourt, George Simon...35, St. George's Square, S.W.
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Murray, Charles Robert Scott...Danesfield, Marlow, Buckinghamshire

Naper, James Lennox William...Lough Crew, Old Castle, Ireland
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Palmer, Robert...Holme Park, Reading, Berkshire
Patten, Col. John Wilson, M.P....Bank Hall, Warrington, Lancashire
Penrhyn, Lord...Penrhyn Castle, Bangor, Carnarvonshire
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Rigg, Jonathan...4, Chester Place, Hyde Park Square, W.
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Saint Germans, Earl of...Port Eliot, Devonport, Devonshire
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†Scholey, William Stephenson...Freemantle Lodge, Castle Hill, Reading, Berkshire
†Shadwell, Lucas...Fairlight, Hastings, Sussex
†Smith, John Abel, M.P....37, Chester Square, S.W.
Sondes, Lord...Elmham Hall, Thetford, Norfolk
Sotheron-Estcourt, Rt. Hon. Thos. H. S....Estcourt, Tetbury, Gloucestershire
†Southampton, Lord...Whittlebury Lodge, Towcester, Northamptonshire
Stafford, Lord...Cossey Hall, Norwich, Norfolk
†Stradbroke, Earl of...Henham Park, Wangford, Suffolk
†Sutherland, Duke of, K.G....Stafford House, St. James's, S.W.
Sutton, John Manners...Kelham, Newark, Notts.

Tanqueray, John Samuel...Hendon, N.W.
Taunton, Lord...Stowey, Somersetshire

†Thompson, H. S....Kirby Hall, York
Thorold, Sir John Charles, Bart....Syston Park, Grantham, Lincolnshire
Torrington, Viscount...Yokes Court, Mereworth, Kent
Towneley, Col. Charles...Towneley, Burnley, Lancashire
†Tredegar, Lord...Tredegar Park, Newport, Monmouthshire
Tunno, Edward Rose...Warnford Park, Bishop's Waltham, Hampshire
Tuxford, George Parker...265, Strand, W.C.

Wales, H.R.H. Prince of, K.G., &c....Marlborough House, S.W.
Walsingham, Lord...Merton Hall, Thetford, Norfolk
†Warner, Edward, M.P....Higham Hall, Woodford, Essex
†Warwick, Earl of...Warwick Castle, Warwick
Westminster, Marquis of, K.G....Motcombe House, Shaftesbury, Dorset
†Whitbread, William Henry...Southhill House, Bedford
†Williams, Chancellor, Rev. Sir Erasmus, Bt...Chancellor Manor House, St. David's
†Wilson, Major Fuller Maitland...Stowlangtoft Hall, Bury St. Edmund's, Suffolk
Wynn, Sir Watkin Williams, Bart., M.P....Wynnstay, Rhuabon, Denbighshire

Zetland, Earl of...Aske Hall, Richmond, Yorkshire

List of Members.

† Life Member's mark.

A.

Abbot, Chas. H....Bower, Long Ashton, Bristol
†Abbott, Stephen, jun....Castleacre, Swaffham
Abbott, Wm...Hill Farm, Gt. Wigborough, Colchester
Abbotts, R. W....Burton-on-Trent
Abell, Martin, Worcester
Abercorn, Duke of, K.G....Chesterfield Ho., W.
Abraham, Thomas...Dunster, Taunton
†Abrey, Thomas Shaw Hellier...Witham, Essex
†Ackers, James...Prinknash Park, Painswick
Acland, Sir Peregrine, P. F. P., Bart....Bridgwater
Acland, Thomas Dyke, M.P....Sprydoncote, Exeter
Acock Arthur...Cold Aston, Northleach
Acton, William...Fern Acres, Slough
†Acworth, N. B....The Hook, Northaw, Middlesex
Adair, Sir R. Shafto, Bart....20A, St. James's Square
Adams, George...Collaton, Kingsbridge, Devon
Adams, Capt. G. Curtis, R.N...Anstey Hall, Coventry
Adams, G. T....Hawkhurst, Kent
Adams, James...The Fallowes, Oxton, Southwell
Adcock, William...Farndish, Wellingborough
†Adderley, Rt. Hon. C. B., M.P.. Hams Hall, Minworth
Addison, John....6, Delahay Street, Westminster
Addison, J....Brookfield, Gretton, Uppingham
Adeane, Henry J...Babraham Park, Cambridge
Adkins, George C....The Lightwoods, Birmingham
Adkins, Henry...The Firs, Edgbaston, Birmingham
Agar, Thomas...Lower Hastings Street, Leicester
Agar, William...5, Upper King Street, Leicester
†Ahrens, E...New Schlagsdorf, Schwerin, Mecklenbg
Akers, Henry...Black Bourton, Faringdon
†Akroyd, Edward, M.P...Bank Field, Halifax
Alcock-Beck, William...Hawkshead, Windermere
Alder, Frederick John...Warlaby House, Louth
Alderman, Rev. F. C....Kintbury, Hungerford
Alderman, Robert...Farndish, Wellingborough
†Alderson, John...Thornby Villa, Wigton
Aldous, James Arthur...Lingwood, Norwich
†Aldridge, Major J....St. Leonard's Forest, Horsham
†Aldworth, W., jun....Frilford, Abingdon
†Alexander, Edward...Leominster
Alexander, J. C....Herne Hill, Faversham
†Alexander, R. C. B....Downs House, Staplehurst
Alexander, W. L....Shatton Lodge, Cockermouth
†Alington, G. M....Swinhope House, Grimsby
Alison, John...Brightlands, Reigate
Allcock, Charles...Bulwell, Nottingham
†Allcroft, J.D....Worcester
†Allen, B. Haigh...Clifford Priory, Hereford
Allen, George....The Manor Farm, Old Windsor
Allen, Henry...Oakfield, Hay, Herefordshire
†Allen, John...Knighton, Leicester
Allen, John R....Oak House, Preston, Lancashire
Allen, Joseph, jun....19, Seymour Street, Leicester
Allen, Major Ralph S....Bathampton, Bath
Allen, Rev. Dr...Shouldham Hall, Downham Market
Allen, Stephen H....Eastover, Andover
Allen, Thomas...Thurmaston, Leicester
Allen, Thomas N....The Vache, Chalfont St. Giles
Allenby, George...Hallington, Louth, Lincolnshire
†Allfrey, H.W...Hemingford Ho., Stratford-on-Avon
†Allfrey, Robert...Wakefield Park, Reading
Allender, G. M....33, Hereford Road, Bayswater, W.
Allender, H. J....6, Belmont Rd., Anfield, Liverpool
Allerton, Alex. R....Colemans, Prittlewell, Essex
Allison, James John...Sunderland
Allison, Wm. H....Bilby, East Retford
Allsopp, Henry...Hindlip Hall, Worcester
†Ambler, Henry...Watkinson Hall, Halifax
Amcotts, Col. Cracroft...Hackthorn Hall, Lincoln
Amery, F. S....Druid, Ashburton
Ames, John...Clevelands, Lyme, Dorset
Ames, Lionel...The Hyde, St. Albans
†Amhurst, W. A. T....Didlington Park, Brandon
Amos, Chas. E...5, Cedars Road, Clapham Common
Amos, James, jun....Broomfield, Herne Bay
†Ananoff, Alexander...Koutais, Russia
†Ananoff, Ivan...Moscow
†Anderson, Alexander...
Anderson, Rev. Ch. G....Countesthorpe, Leicester
†Anderson, R....Grey Street, Newcastle-upon-Tyne
Anderson, Robert A....Cirencester
Andrews, Henry...Wylye, Heytesbury
Andrews, Onslow...Bradbourne, Ashford
Angrave, Thomas C....East Leake, Loughborough
Angus, George...Wallsend, Northumberland
Angus, John, jun....Whitefield, Morpeth
Angus, John..100, Percy Street, Newcastle-on-Tyne
†Anson, Sir John, Bart....Avisford, Arundel
Anstey, Samuel...Menabilly Farm, Par Station
Anstice, J....Madeley Wood, Wellington, Salop
†Anstruther, J. H. L....Hintlesham Hall, Ipswich
Anthony, John...Yealmpton, Plympton
†Aplin, Henry..Combe St. Nicholas, Chard, Somerset
†Appach, Reginald..Maytham Hall, Rolvenden, Kent
†Applewhaite, Edward..Pickenham Hall, Swaffham
Apps, John, jun....Goudhurst, Staplehurst
Arabin, W. St. Julien...Englefield Green, Egham

†Aranjo, Captain F. J. da Silva...Rio de Janeiro
†Arbuthnot, John A....Cowarth, Chertsey, Surrey
Arbuthnot, W. U....Bridgen Place, Kent
†Arcedeckne, Andrew...Glevering Hall, Suffolk
Archer, James...Park View, Whitchurch
Ardley, Thomas, Long Melford
Ardron, John...Queniborough, Leicester
Arkcoll, Thomas...The Meads, Eastbourne
Arkell, H....Butlers' Ct., Boddington, Cheltenham
†Arkell, Thomas...Pen Hill Farm, Swindon, Wilts
Arkell, Thomas...Boddington House, Cheltenham
Arkle, Thomas...Shaftoe, Newcastle-on-Tyne
Arkwright, A.W..Broughton Astley Ho., Lutterworth
Arkwright, Peter...Willersby, Matlock, Derbyshire
Armitage, Arthur...Moraston, Ross, Herefordshire
Armstrong, C...Hawthorne Ter., Newcastle-on-Tyne
Armstrong, G...Heddon-on-the-Wall, Northumb.
Armstrong, George...Thornton Heath, Surrey
Armstrong, H., M.D...Peckham Ho., Peckham, S.E.
Armstrong, John...Palterton, Chesterfield
Armstrong, J. A...Cumberland Mills, Isle of Dogs, E.
Armstrong, Wm. Jones Wright...Killylea, Armagh
Arnold, George, jun....Dolton, North Devon
Arnold, Matthew...Westmeon, Petersfield
Arnold, Rev. Richard A....Ellough, Beccles
Arnott, T. Reid...7, Mersey Chambers, Liverpool
Arthur, Col. Charles...Misterton Hall, Lutterworth
Ashby, T. W....Rutland Terrace, Stamford
Ashby, J. W..Knaptoft, Husbands Bosworth, Rugby
Ashcroft, Thomas...Walford, Eccleshall, Staffs.
Ashdown, S. H....Uppington, Wellington, Salop
Ashhurst, John H....Waterstock, Oxford
Ashlin, John...Firsby, Spilsby
Ashmore, John...Norton, Evesham
†Ashton, Henry...Woolton, Liverpool
†Ashton, T. Henry...Temple Langherne, Worcester
Ashton, T. M....Deeping St. Nicholas, Spalding
Ashwin, Manley C....Ryon Hill, Stratford-on-Avon
Ashworth, Charles E....Fairfield, Manchester
†Askew, Sir H., Bt....Pallinsburn Ho., Coldstream
†Askew, Watson...Pallinsburn, Coldstream
Asten, William...Oddingley, Droitwich
†Astley, F. L'Estrange...Melton Constable, Thetford
†Aston, S....Bushwood Lodge, Henley-in-Arden
†Atchison, Wm...Bowling Iron Company, Bradford
†Atherton, Tho....Chapel House, Speke, Liverpool
†Athorpe, J. C....Dinnington Hall, Rotherham
Athreton, George T....Broomhill, Carlisle
†Atkinson, James...Winderwath, Penrith
†Atkinson, J. H. H....Angerton, Morpeth
†Atkinson, W....Gt. Rapers, Bures St. Mary's
Atkinson, William...Ashton Hayes, Chester
Attenborough, J....Brampton Ash, Market Harbro'
Attenborough, Richard...Whilby Grove, Reading
Attwater, J. Gay...Britford, Salisbury
Aveling, Thomas...Rochester
Avery, Thomas Charles...Gloucester
†Avery, Wm. Howard...Stockton Grange, Shiffnal
Awbery, F. D....St. Lawrence Wootton, Basingstoke
†Aylesford, Earl of...Packington Hall, Coventry.
†Aylmer, H....West Dereham, Stoke Ferry, Norfolk
†Aylmer, J. B....Fincham Hall, Downham, Norfolk
Aylmer, John H....Walworth Castle, Darlington
†Aylmer, R. B....Westacre Abbey, Swaffham
†Aynsley, J. Murray...Underdown, Ledbury
†Aytoun, R. Sinclair, M.P...Inchdairnie, Kirkcaldie

B.

†Babington, Prof. Charles Cardale...Cambridge
Bacchus, W. E....Brampton Ash, Market Harboro'
†Back, John Alfred...The Old Hall, Wymondham
Bacon, Rev. H....Baxterley Rectory, Atherstone
Bacon, James, Pluckley, Ashford, Kent
Bacon, Samuel, jun....Ratcliffe Culey, Atherstone
†Backhouse, Edmund...Polam Hill, Darlington
Badcock, Benjamin...Broad Street, Oxford
Badcock, P....4, Aldridge Rd. Villas, Westbourne Pk.
Badcock, Rev. T....Fleckney Vic., Mkt. Harboro'
Badham, George...Wingmoor, Cheltenham
Badham, G. D....Bulmer Tye, Sudbury
Bagot, Rev. R. Wolfe...Foulstown Glebe, Kildare
†Bagot, Lord...Blithefield, Rugeley, Staffordshire
Bagshaw, John...Belstead, Ipswich
Bailey, Edward...Leicester
†Bailey, Henry...Nanty Glo House, Newport, Mon.
†Bailey, James...Nynehead, Wellington, Somerset
†Bailey, Wm....Hazling, Belford, Northumberland
†Baillie, Evan...St. Austin's, Torquay
†Baillie, Hamilton...Ash Hall, Cowbridge
Baillie, Wm. Hunter...96, Upper Harley Street, W.
Baily, Rev. H. G....The Vicarage, Swindon
Baily, J....113, Mount St., Berkeley Square, W.
Baily, T. F....11, Queen Street, May Fair, W.
Bainbridge, E. M....Leazes Villa, Newcast.-on-Tyne
Bainbridge, Robt. S....Woodhorn Grange, Morpeth
Baines, John...Knighton, Leicester
Baker, Anne...Grendon, Atherstone
Baker, Benjamin Heath...Acle, Norwich
Baker, C....Half-moon Passage, Gracechurch-st., E.C.
†Baker, Sir E. Baker, Bart...Ranston Ho., Blandford
Baker, G. W....Orwell Park Office, Levington, Ipsh.
Baker, H. Orde Lloyd..Hardwicke Court, Gloucester
†Baker, Hugh Massey...Kidnall, Malpas, Cheshire
Baker, James...Drayton Bassett, Tamworth
Baker, John...Hockley, Rayleigh, Essex
†Baker, John...
†Baker, J. Lake...Hargrave, Kimbolton
Baker, Robert...Garmston, East Retford
†Baker, T. Barwick L...Hardwicke Court, Gloucester
Baker, Thomas...Barton, Cambridge
Baker, William...Moor Barns, Atherstone
†Baker, Wm. H...Vernon Cottage, Shanklin, I.W.
†Baldwin, John...Luddington, Stratford-on-Avon
Baldwin, Thomas...Glasnevin, Dublin
Baldwin, Thomas
Baldwin, Wm. Hen....Normanton Hall, Normanton
Balfour, D....Balfour Castle, Kirkwall, N.B.
Ball, William...Rothwell, Kettering
Ballard, Philip...Leighton Court, Bromyard
†Balmer, Thomas...Fochabers, N.B.
Balston, Thomas...Chart Sutton, Staplehurst
Bamlett, A. C....Thirsk
Bancroft, William...Clifton Campvill, Tamworth

Bangham, George A....Bridgnorth, Salop
†Bankes, John Scott...Soughton Hall, Northop
†Banks, John Jackson...Kendal
Bannerman, Alexander...Lytham, Lancashire
Bannerman, Henry...Hunton Court, Maidstone
Bannister, J. S...Weston, Pembridge, Herefordshire
Bantock, Thomas...Merridale Ho., Wolverhampton
Banyard, Thomas, jun....Horningsea, Cambs.
Barber, George...Titlington Mount, Alnwick
Barber, Miles...Barlborough, Chesterfield
Barber, S. W...Hayton Castle, East Retford
Barber, William...Elm Hill, Grimley, Worcester
†Barbour, George...Bolesworth Castle, Chester
†Barbour, R....Bolesworth Castle, Chester
Barchard, F....Horsted Place, Horsted, Uckfield
Barclay, John...Falmouth
†Barclay, G. R....Keavil, Dunfermline, Fifeshire
Barford, William...Peterborough
Baring, Hon. Alex....Bath House, Piccadilly, W.
Baring, John...Oakwood, Chichester
Barker, C. S....12, Buckingham St., Adelphi, W.C.
†Barker, Edward...Pickburn, Doncaster
†Barker, G. I. Raymond...20, Royal Crescent, Bath
†Barker, H.B. Raymond...University Cl., Suffolk St.
Barker, J. H....Rowsley, Bakewell, Derbyshire
Barker, Thomas...Bramall Grange, Stockport
Barker, Walter R. H....Wantage
Barlow, F...The Shrubbery, Hasketon, Woodbridge
Barnard, Charles...Norwich
Barnardiston, Nathaniel C....The Ryes, Sudbury
†Barneby, William...Clater Park, Bromyard
†Barneby-Lutley, J. A...Brockhampton, Worcester
Barnes, C....Chorley Wood House, Rickmansworth
Barnes, Ralph...Exeter
†Barnes, T., M.P....The Quinta, Chirk, N. Wales
Barnes, Thomas...Westland, Moynalty, co. Meath
†Barnes, Wilson...Toft, Bourne
†Barnett, Charles..Stratton Pk., Biggleswade, Beds
Barnett, Henry, M.P....Glympton Park, Woodstock
Barnett, R....Meopham Court, Gravesend
Barnett, William E....Newcastle-on-Tyne
Barnwell, Rev. L. E. M...Deeping St. Nicholas, Spalding
Barrass, Matthew..Killingworth, Newcastle-on-Tyne
Barratt, John R....Panton House, Wragby, Linc.
Barrett, John B....Milton House, Steventon, Berks
Barroby, Miss Elizabeth...Dishforth, Thirsk
†Barrow, John James...Normanton Hall, Southwell
†Barrow, Wm....Bilbrooke House, Wolverhampton
†Barstow, Charles D....Garrow Hill, York
Barter, George...Nunnington, Hereford
Bartholomew, W....Waddington Heath, Lincoln
†Barthropp, N. G....Hacheston, Wickham Market
†Barton, Charles...Holbrook House, Wincanton
†Barton, Charles...Fyfield, Lechlade
Barton, Charles...Coln Rogers, Northleach
Barton, George...Tottington, Thetford
Barton, Gerard...Fundenhall, Wymondham
†Barton John...Westleigh Lodge, Leigh, Lancashire
†Barton, Rev. H. N....St. Ervan Rectory, Padstow
†Barton, J. H....Stapleton Park, Pontefract
Barton, Richard...Caldy Manor, Birkenhead
†Barwell, Thomas...Leicester
Baskerville, H...Crawshay Park, Reading, Berks
Bass, Michael T., M.P....Burton-on-Trent
Bass, W....Duckinfield Lodge, Ashton-under-Lyme
Bassett, Richard...Bonvilstone, Cardiff
Batchelor, T. B....Maindee, Newport, Monmouthsh.
Bate, Edward...Kelsterton, Flintshire, N. Wales
Bate, Richard Stokes...Badger, Shiffnal
Bate, Samuel...Springfields, Newcastle-under-Lyme
†Bateman, Henry...Asthall, Witney, Oxon.
Bateman, J....Croxton Hanmer, Whitchurch, Salop
†Bates, George...Blaxhall Hall, Wickham Market
Bates, J...Umberleigh Ho., Atherington, Barnstaple
Bates, Thomas...Eaton Green, Luton, Beds.
Bathurst, Earl...38, Half-moon Street, W.
Bathurst, Lt.-Col....Clarendon Pk., Salisbury
†Batson, Thos....Sydney College, Bath
Batt, William Henry...West Drayton, Uxbridge
†Battcock, F...Hemingford Abbotts, St. Ives, Hunt.
†Batten, John...Yeovil
Battle, John R....Potter Hanworth, Lincoln
Baumback, Henry...South Elmham Hall, Harleston
†Baxendale, J....Woodside, Whetstone, N.
Baxendale, Richard B....Woodside, Whetstone, N.
Baxter, H. J...Cheadle, Manchester
Baxter, Robert...Doncaster
Baxter, Thomas...Acton Grange, Warrington
†Bayden, Thomas...Hythe, Kent
†Bayden, Thomas, jun....Hythe, Kent
Bayes, Charles...Kettering
Bayley, Capt. D....Friarstown Ho., Tallaght, Dublin
Bayley, Thomas...Lenton, Nottingham
Bayly, John...Plymouth
Bayning, Lady...Honingham Hall, Norfolk
Bayzand, Jos....Kingley, Alcester, Redditch
Beach, John A....The Park, Redmarley, Newent
†Beach, Sir M. E. H., Bt., M.P. Williamstrip Pk., Fairfd.
Beachell, John...Rawcliffe, Selby, Yorkshire
Beadel, Wm. James...Chelmsford
Beadon, Rev. F....North Stoneham Rectory, Hants
Beale, E. J....237, High Holborn, W.C.
Beale, Jos....Manor House, Burbage, Hinckley
†Beale, William...Larkins Farm, Chiddingstone
Beales, William...Barton Hall, Mildenhall
Bealey, J. Edward...Bloxwich, Walsall, Staffs.
Beamand, William...Newcastle, Clun, Salop
†Bean, Alf. W....Dansom Park, Welling, S.E.
†Bearcroft, E....Mere Hall, Droitwich
†Beard, Frederic...Horton, Canterbury
Beard, John...Linton, Burton-on-Trent
Beard, C....Bury St. Edmund's
Beard, W....Tormarton, Cross Hands, Chippenham
Beards, Thomas...Stowe Park, Buckingham
Bearn, William...Finedon Hill, Higham Ferrers
Beart, Charles...Stow Bardolph, Downham Market
†Beart, Robert...Godmanchester, Huntingdonshire
Beasley, John...Brampton, Northampton
†Beattie, James...Newbie House, Annan, N.B.
Beauchamp, Chas. D....93, Lansdowne Road, W.
Beauchamp, Sir T. W. B., Bt...Langley Hl., Norwich
Beaumont, E. B....Woodhall, Barnsley, Yorkshire,
Beaumont, Francis H....Buckland Court, Reigate
†Beaumont, Geo., jun....Bridgeford Hill, Notts
†Beaumont, J. A....Park House, Wimbledon, S.W.
†Beaumont, W. B., M.P..Bywell Hall, Newc.-on-Tyne

Beaven, C...Ivy Ho. Farm, Shipton Moyne, Tetbury
Beaven, James...West Leaze Farm, Swindon
Beck, Charles W....Upton Priory, Macclesfield
Beck, J....St. Ann Street, Lynn, Norfolk
Beck, Peter...Shrewsbury
Beckitt, Richard...Watton Abbey, Driffield
Beckwith, Rev. H..Eaton Constantine, Wellngtn.,Sal.
†Beckwith, Thos. Percival...9, Eccleston Squ., S.W.
Beddoe, Richard C....4, Whetherell Place, Clifton
Beer, Jas. Henry...29, St. George's St., Canterbury
Beever, Rev. William Holt...Pencraig Court, Ross.
Beevor, Henry...Blyth, Worksop
†Begg, David, M.D....Canons Park, Edgware, N.W.
Belcher, Charles...The Crescent, Bedford
†Beldam, Valentine...Royston, Hertfordshire
Bell, Ancill...The Manor Ho., N. Kyme, Sleaford
†Bell, Daniel...Hollins, Whitehaven
Bell, Capt. Henry...Chalfont Lodge, Cheltenham
Bell, John...Breaks Hall, Appleby, Westmoreland
Bell, Matthew...Bourne Park, Canterbury
Bell, Robert...Newcastle-on-Tyne
Bell, Thos...Marlborough Cres., Newcastle-on-Tyne
Bell, Thomas...Plaistow, E.
Bell, William...Cramlington, Northumberland
Bell, J. Williams...Gillingham, Bath
Bellairs, George Clarke...Newarke, Leicester
Bellew, J. Froude...Stockleigh Court, Crediton
Bellyre, Edwin F....Chirk, North Wales
Beman, Thomas...Weston-Subedge, Broadway
†Bence, Capt....Kentwell Hall, Long Melford
Bence, Henry A....Thorington Hall, Saxmundham
Benington, T...Wallingfen Ho., North Cave, Yorks.
†Bennell, Joseph...Hitchin, Herts
Bennet, Philip...Rougham Hall, Bury St. Edmund's
†Bennett, B. E...Marston Trussell Hall, Rugby
Bennett, E. ...Bedstone Ho., Aston-on-Clun, Salop
Bennett, E. Gasking...Plymouth
Bennett, Rev. Henry Leigh...Thorpe, Egham
Bennett, James...Ingestone, Ross
Bennett, John...Little Rissington, Burford, Oxon
Bennett, John...The Banks, Mountfield, Hurst Green
Bennett, John Ewins...Bosworth Grange, Rugby
Bennett, Jos. B. H....Tutbury, Burton-on-Trent
Bennett, Stephen White...Wareham
Bennett, T....Park Farm, Woburn, Bedfordshire
Bennett, Thos. Oatley...Bruton, Somersetshire
Bennion, Ed. David...Summer Hill, Oswestry
†Benson, George...Lutwyche Hall, Wenlock, Salop
Benson, John...Tavistock
†Benson, William...Allerwash House, Hexham
Bent, Thomas...Queniborough, Leicester
Bentall, Edward H....Heybridge, Maldon, Essex
Bentley, Robert John...Firmingley Park, Bawtry
Benyon, Rev. E. R. ...Culford Hall, Bury St. Edm.
†Benyon, R., M.P....Englefield House, Reading
Beridge, Rev. Basil...Algarkirk, Spalding
Berkeley, Cuthbert...Marley Hill, Gateshead
†Berkeley, Robert...Spetchley Park, Worcester
†Berners, John...Holbrook, Ipswich
†Berners, Rt. Hon. Lady...Keythorpe Hall, Leicester
†Berney, Sir Hanson, Bart....Sheepy, Atherstone
Berridge, Thos...Sutton-in-the-Elms, Lutterworth
†Berrington, A. D....Pant y Goitre, Newport, Mon.
Berry, William...High Street, Leicester.
Besley, Henry...South Street, Exeter
Bessborough, Earl of...Pilltown, Ireland
†Best, Hon. and Rev. S....Abbotts Ann, Andover
Best, James, jun....Hill Top, Tenbury
†Best, J. Vincent...PriorsBarton, St. Cross, Winchester
Best, Rev. Thomas..Red Rice House, Andover
Bethell, William...Rise, Beverley
†Bethune, Alexander...Blebo, Cupar, Fife, N.B.
Bettinson, R....Cawthorpe, Bourne, Lincolnshire
Betts, Ed. Ludd...Broom Park, Betchworth, Surrey
Betts, John...King's Langley, Hertfordshire
Bevan, Beckford...Bury St. Edmund's
Bevan, G. Innes...Godmanchester, Huntingdon
Bevan, William R....Bury St. Edmund's
Beverley, Matthew B....Leeds
Beviss, John...Sydling, Dorchester, Dorset
Bickford, Joseph...Oxley, Wolverhampton
Biddell, G. Arthur...Ipswich
†Biddell, Herman...Playford, Ipswich
†Biddell, Manfred...Playford, Ipswich
†Biddell, W....Hawstead Hall, Bury St. Edmund's
Biddulph, Col. R. M., M.P..Chirk Castle, Chirk, N.W.
Bidwell, Charles M....Ely
Bigg, T...Leicester House, Great Dover Street, S.E.
Bigge, Chas. Selby..Bourton Grange, Much Wenlock
Biggs, John...Cublington, Leighton Buzzard
Bill, John...Trent Vale, Stoke-on-Trent
Bingham, Col. R. H...BinghamsMelcombe, Dorchester
†Birch, George Francis...Clare Park, Farnham
Birch, T....Broomyhill Farm, Belmont, Hereford
†Birchall, T...Kibbleton Hall, Preston, Lancashire
†Bircham, William G....Dunton, Fakenham
†Bird, J....Yaxley, Stilton, Huntingdonshire
†Bird, Rev. J. Waller...Briston, East Dereham
†Birkbeck, Henry...Norwich
†Birkbeck, Robert...Gatton, Reigate
Birket, C....Plungington Hall, Preston, Lancashire
Birkin, Richard...Aspley Hall, Nottingham
Birmingham, Wm....Killerton, Broadclist, Devon
Birt, Jacob...23, Sussex Gardens, Hyde Park, W.
Biscoe, T.P.B....Kingellie House, Newton, Inverness
Bishop, James...The Lays, Tarrington, Ledbury
Bishop, James...Looe, Cornwall
Bishop, John...3, The Walk, Market Pl., Norwich
Bithrey, Wm. Silvester...Hastings Street, Leicester
Blackbourn, D....Temple Brewer, Sleaford, Linc.
Blackburne, Jas. Taddy...The CampFarm, Aldershot
Blackburne, J. Ireland...Hale, Warrington
Blackburne, Lt.-Col. I., jun....Hale Hall, Warrington
†Blacker, M. M....Claremount, Claremorris, Mayo
Blackett, Sir E., Bart....Matfen, Newcastle-on-Tyne
Blackett, E. A., R.N...Oakwood, Wylam, Northum.
Blackstone, J....1, Gloucester Rd., Regent'sPk., N.W.
†Blair, John...
Blake, Alfred...Sutton, Stanton-Harcourt, Witney
Blake, Francis John...Norwich
Blake, William...Bridge, South Petherton
Blake, Wm. John...Danesbury, Welwyn
Bland, George...Coleby Hall, Lincoln
Bland, William...Hartlip, Sittingbourne
Blandford, Thomas...Corbridge, Northumberland
Blane, Col. Robt....The Oaks, Sunninghill, Staines

†Blanshard, Richard...53, Chancery Lane, W.C.
Blashill, Henry...Bishopstone, Hereford
†Blathwayt, Geo. W., jun...Dyrham, Chippenham
Blencowe, George...Bury St. Edmund's
Blencowe, J. George....Bineham, Lewes
†Blencowe, Robert A....
Blencowe, Robert Willis...The Hooke, Lewes
Blenkinsop, John...Simonside Ho., South Shields
Blenkiron, William...Middle Park, Eltham
Blick, John...Hill Court, Droitwich
Blinkhorn, Thomas...Spalding
†Blisset, Rev. H....Letton, Weobley, Hereford
Blomfield, John...Warham, Wells, Norfolk
Blow, W. W...Tavistock Hotel, Covent Garden, W.C.
Blucke, Rev. W. S...Willoughby, Lutterworth
Blundell, J....3, Portland Street, Southampton
Blurton, W. Mountfort...Field Hall, Uttoxeter
Blyth, D'Urban...Great Massingham, Rougham
Blyth, H. E....Sussex Farm, Burnham, Lynn
†Blyth, James...24, Hyde Park Gardens, W.
†Board, John...Westerham, Sevenoaks
Boards, Edward...Edmonton, N.
Boards, William...Edmonton, N.
†Boby, Charles...Stutton, Ipswich
Boby, George...St. Andrew's Castle, Bury St. Edmd's
†Boby, Robert...Bury St. Edmund's
Boddington, Henry..Monton Ho, Eccles, Lancashire
Bodley, John...Stockleigh Pomeroy, Crediton
Body, John...The College, Wittersham, Peasmarsh
†Body, R. B....Hyde End, Shinfield, Reading
Boger, Deeble...Wolsdon, Devonport
Boger, Hext...Lower Durnford St., Stonehouse, Dev.
†Boghurst, William P....Frating Abbey, Colchester
Boileau, Sir J. P., Bt...Ketteringham Pk. Wymndhm.
Bolam, C. G....DurleyHo., Savernake Forest, Marlbh.
Bolam, Harry G....Keverstone, Staindrop, Durham
†Bolam, Robt. G....Weetwood Hall, Wooler
Bolam, W. T....Newcastle-on-Tyne
Bolden, Samuel E....Lancaster
Boldero, John...Rattlesden, Woolpit
†Bolitho, Edward...Trewiden, Penzance
Bolitho, R. F....Ponsandam, Penzance
†Bolitho, T. S....Pendlverne, Penzance
†Bolitho, William...Penzance
Bolton, Daniel...Offington, Worthing
†Bolton, Jasper...Ballykisteen, Tipperary
Bolton, John A., M.D....Campbell Street, Leicester
†Bolton, Lord...Bolton Hall, Bedale
Bomford, Benjamin...Pitchill, Evesham
Bomford, Heming James...Dunnington, Alcester
Bond, Barnabas...Alburgh, Harleston, Norfolk
Bond, Benjamin...Draycot, Cheadle, Staffordshire
Bond, Rev. N....Creech Grange, Wareham
Bond, Robert...10, Queen Street, Ipswich
Bond, Thomas...Pulham Hall, Harleston
Bone, Henry...Avon, Ringwood, Hants
Bonham, Rev. J....Ballintaggart, Ballistore, Ireland
Bonnall, John...Grantham
Bonnell, J. H....Pelling Place, Old Windsor
†Bonner, H. C....East Rudham, Rougham, Norfolk
†Booth, James Godfrey...Hamburgh
Booth, John B....Killerby, Catterick, Yorkshire
Booth, John...Cotham, Newark, Nottinghamshire
Booth, John...Shenstone Hall, Lichfield
Booth, Thomas C....Warlaby, Northallerton
Borman, Luke...Irby, Caistor, Lincolnshire
†Borough, C. B....Chetwynd Pk., Newport, Salop
Borries, Christian...Quay, Newcastle-on-Tyne
Borthwick, John...Prospect, Carrickfergus
Borthwick, William...Monkwray, Whitehaven
†Bortier, Monsieur...La Panne
Borton, John...Barton-le-Street, Malton
†Bosanquet, Horace S....Broxbourne Pk, Hoddesden
Bosanquet, Rev. R. W....Roch, Alnwick
Bosley, John...Lower Leyde, Hereford
Bostock, Thomas...Hill Top, Burslem
Bosworth, J. Green...Greetham, Oakham, Rutland
†Botham, George...Wexham Court, Slough, Bucks
Botly, Wm....Salisbury Villa, Upper Norwood, S.
Bott, William...Nantwich
Botteley, Thos. Downes..Tixall Heath, Stafford
Botterill, John...Eppleworth, Cottingham, Hull
Botting, William...Westmeston Pl., Hurstpierpoint
Bottom, Charles..Newmarket
Boucherett, Henry Robert...Hoarcross, Rugeley
†Bouck, John T....Manchester
Boulthee, J....Noyadd Ho., Aberayron, South Wales
Boulter, Thomas...Shenstone House, Kidderminster
Boulton, R. C....Lower Ballingham, Ross.
†Bourn, James...Mawley, Cleobury-Mortimer
Bourne, J....Bugsell Farm, Salehurst, Hurst Green
Bourne, John...Hilderstone, Stone, Staffordshire
Bourne, John...N. E. Railway, Newcastle-on-Tyne
Bourne, Sam....Goldsmith Ho., Whitchurch, Salop
Bourne, William...Atherstone
Bowden, Wm., jun....Prospect Ho., Cirencester
Bowen, J. B., M.P....Llwyngwair, Haverfordwest
Bowen, J., jun....Dunvall Ho., Bridgenorth, Salop
Bowen, P. W....Shrawardine Castle, Shrewsbury
Bower, Capt. T. B....Iwerne House, Blandford
Bowers, Henry R....Abbot's Lodge, Chester
Bowler, Wm. Anthony...4, Whitehall Place, S.W.
Bowly, Edward...Siddington House, Cirencester
Bowly, William...Cirencester
Bowser, R...Bishop Auckland, Durham
Bowstead, Jas. Cooper...Hackthorpe Hall, Penrith
†Bowstead, Thomas...Eden Hall, Penrith
†Bowyer, Capt. H. A....Steeple-Aston, Woodstock
Boxall, W. B....Strathfieldsaye, Winchfield
Boyd, E. Fenwick...Moor House, Durham
Boyer, W....Sywell House, Northampton
Boys, Robert...Eastbourne
Braby, James...Maybanks, Rudgwick, Horsham
Bracebridge, C. H....Atherstone Hall, Atherstone
Bradburn, Wilton...Hilton, Wolverhampton
Bradburne, J. Hanbury...Pipe Place, Lichfield
Bradbury, Thomas...Longroyde, Brighouse
Bradbury, Wm....Bradley Green Colliery, Congleton
Braddock, Henry...Bury St. Edmund's
Bradford, Earl of...43, Belgrave Square, S.W.
Bradford, Thomas...63, Fleet Street, E.C.
Bradley, Alex....Whepstead, Bury St. Edmund's
Bradley, Thomas...Richmond, Yorkshire
†Bradshaw, John...Knowle, Cranleigh, Surrey
Bradshaw, W...Slade Ho., Levenshulme, Manchester
Bradstock, Thomas S....Cobrey Park, Ross

†Braikenridge, J. H....Chew Magna, Bristol
Bramley, Charles...Fiskerton Hall, Lincoln
Bramley-Moore, J...Gerards Cross, Bucks
Bramwell, F. J....35A, Gt. George St., Westmin. S.W.
Brand, Rt. Hon. Henry, M.P....Glynde, Lewes
Brand, J. S....Bank, Leicester
†Brander, R. B....Tanbridge House, Horsham
Brandford, John W....March, Cambs
Branson, William Chas....Little Weldon, Wansford
Branwhite, F...Chapel House, Long Melford, Suffolk
Brasnett, J....Hilboro' Lodge, Brandon, Norfolk
†Brassey, Henry A....Woodhorn Manor, Morpeth
Bravender, John...Cirencester
Bray, George...The Haven, Dilwyn, Leominster
†Braybrooke, Lord...Audley End, Saffron Walden
†Breach, J. G....14, Prince of Wales Ter., Kensgtn.
Brealey, John...Leek, Staffordshire.
Breavington, W. G. K...Bath Road, Hounslow, W.
Brebner, James..Norfolk Farm, Windsor Great Park
Brereton, Rev. J. Lloyd..LittleMassingham, Rougham
Brett, John...Burton Joyce, Nottingham
Brett, John...Oxton Grange, Southwell
Brett, John Lowdham...Corfe Lodge, Wimborne
Brett, Wilford George...29, Clarges Street, W.
†Bretts, Chas....
Brewster, Jas....2, Westbourne Road, Barnsbury, N.
Brewster, John...Stretton Mill, Pinkridge
Brewster, S. N....The Limes, Rushmere, Ipswich
Brewster, W....Balderton Hall, Middle Shrewsbury
Brickwell, C. J....Overthorpe Lodge, Banbury
Bridge, Thomas...Wynford Eagle, Dorchester
Bridge, Thomas...Buttsbury, Ingatestone
Bridges, Harry...Stowmarket
Brierly, Harry, jun....Church Lawford, Rugby
†Briggs, Rawdon...Birstwith Hall, Ripley, Yorksh.
Briggs, Rev. T. Barker W...Caple Lodge, Folkestone
Briggs, William...Hylton Castle, Sunderland
Briggs, William....Elford Park, Tamworth
Bright, J....Longford, Market Drayton, Shropshire
†Bright, John...Bath Row House, Birmingham
†Briscoe, Sir Robert, Bt....Crofton Hall, Wigton
†Brise, Lieut.-Col. S.B.R...Spains Hall, Braintree
Britten, Thomas...Little Billing, Northampton
†Broadhurst, John...Foston, Derby
Brodhurst, Lucas...Haywood Oaks, Mansfield
Brodie, John...Braken House, Melsonby, Darlington
Brodrick, George...Carshalton, S.
Brogden, Alexander...Ulverston
Bromet, William R....Cocksford, Tadcaster
Bromfield, H...Hollow Meadow, Stratford-on-Avon
Bromfield, Thomas...Quay, Newcastle-on-Tyne
Bromley, James...Forton, Garstang
Bromley, John...Derby
Bromley, John...Lancaster
†Bromley, J. R....Gesyns, Newmarket
Bromwich, Thomas...Woolston, Coventry
Brook, Arthur Sawyer...Bexhill, Hastings
Brook, Charles....Enderby Hall, Leicester
Brook, J...Park Farm, St. Helen's, Isle of Wight
Brooke, H....Wetheringsett, Stonham
Brooke, John....Capel, Ipswich
Brooke, Rev. John...Haughton, Shiffnal
Brooke, John W....Sibton Park, Yoxford, Suffolk
†Brooke, William...Northgate House, Huddersfield
†Brooke, Sir W. De Capell, Bart....Market-Harbro'
Brooks, J. M....7, Charlotte Street, Manchester
Broomhall, T. T...Beech Cliff, Newcastle, Staffords.
Broughton, E. Delves...Wistaston Hall, Nantwich
†Broughton, Capt P....Tunstall Hall, Mt. Drayton
Browell, Edmund J. J....Boldon, Gateshead
†Brown, A. H. C....Kingston House, Tetsworth
Brown, B....Manor House, Shipbourne, Tonbridge
Brown, Cuthbert...Jesmond, Newcastle-on-Tyne
Brown, David...Cathendine House, Brecon
†Brown, Douglas...15, Hertford Street, Mayfair
Brown, Eldred Roberts...The Abbey, Plymouth
Brown, George...Avebury, Calne
Brown, George...Roborough House, Barnstaple
Brown, Prof. Geo. T....7A, New Cavendish St., W.
Brown, Henry...Ashby-de-la-Zouch
†Brown, Rev. H. H....
Brown, James...Liverpool Arms Hotel, Chester
Brown, John...Tring
Brown, John...Coldham Hall, Wisbeach
Brown, John...Compton, Newbury
Brown, J. Washbourne...Ufcott, Swindon
Brown, Martin...Benton, Newcastle-on-Tyne
Brown, Michael L....Tillington, Stafford
Brown, Rev. N. M..Fairy Fort, Newtown, Limavady
†Brown, Potto...Houghton, Huntingdon
Brown, Ralph...Whickham, Gateshead
Brown, Robert...Wigginton House, Tamworth
†Brown, Thomas...Buckham Hall, Uckfield
†Brown, Thomas...Marham, Downham Market
Brown, Thomas...Horton, Devizes
Brown, Thos. James...The Moor, Hereford
Brown, William...Tring
Brown, William...Devizes (North Wilts Foundry)
Brown, Wm....Wirswall, Whitchurch, Salop
Brown, William...Holme-on-Spalding Moor, York
Brown, W. J....Hazlebury House, Chippenham
Browne, George...Troutbeck, Windermere
†Browne, Lord J. T., M.P....Westport, co. Mayo
Browne, Philip M....Fornham, Bury St. Edmund's
Browne, Robt. Palmer...Greenwich, S.E.
Browne, Samuel...Brockton Hall, Shiffnal
Browne, Thos. Beale..Salperton Park, Andoversford
Browne, T. B...MellingtonHl., Churchstoke, Mntgm.
Browne, Rev. T. C....59, High Street, Oxford
†Browne, Wade...The Rocks, Bath
Browning, F....La Patrimoine, St. Lawrens, Jersey
Browning, James T....Oxford
Browning, S...Joint Counties Asylum, Abergavenny
Bruce, John...Tiddington, Stratford-on-Avon
Bruce, Maj. C. L. C., M.P....Dunphail, Forres, N.B.
Brunsdon, Benjamin...Ross
†Bruxner, Rev. G. E., M.A..Thurlaxton, Hinckley
Bryan, Frederick Thos....Humberstone, Leicester
Bryan, John...Southleigh, Witney
Bryan, T....Seaton Lodge, Uppingham
Brymer, John...Ilsington House, Dorchester
†Bubb, Anthony....Witcombe Court, Gloucester
†Buck, Albert...Sansome Terrace, Worcester
†Buckingham, Duke of...Wootten, Aylesbury
Buckland, George...Benenden, Staplehurst, Kent
Buckland, J. Avery...Benenden, Staplehurst, Kent

Buckland, Thomas, jun....Wraysbury, Staines
Buckle, John...Uckington, Cheltenham
Buckley, Gen. E. P.....New Hall, Salisbury
Buckley, Jas...Penyfai Ho., Llanelly, Carmarthens.
Buckley, John N....Loughborough
Buckman, Prof...Bradford Abbas, Sherborne, Dorset
Buckworth, T. R....Cockley Cley Hall, Swaffham
Budd, Francis...Hatch Warren, Basingstoke
†Budd, J. Palmer...Ystalyfera, Swansea
†Budd, Thos. W....13, Norfolk Cres., Hyde Pk., W.
Budd, William...Aston-le-Walls, Leamington
Buddicom, Wm. B....Penbedw Hall, Mold
Bugg, Walter...Milborne Wick, Sherborne
Buggins, W....Booth's Farm, New Oscott, Birming.
†Bulford, James...Hordley Farm, Woodstock
Bulkeley, C. Rivers...Bodylltyn, Rhuabon
†Bulkeley, Sir R. W., Bt., M.P...Baron Hill, Beaumaris
†Bullen, John T....Marshwood Manor, Crewkerne
Buller, Sir A., Bart.....Pound, Plymouth
†Buller, Morton Edward...Dilhorn, Cheadle
†Bullock, Ferdinand...Wantage, Berks
†Bullock, George...East Coker, Somerset
Bullock, Rev. Walter...Foulkbourn Hall, Witham
Bulmer, Jeff., jun....Middleton-on-Row, Darlington
†Bult, James S....Dodhill Ho., Kingston, Taunton
†Bulteel, John...Pamflete, Ivybridge
Bulwer, Rev. James...Hanworth Rectory, Thetford
Bulwer, Wm. Lytton...Heydon Hall, Reepham
†Bunbury, Sir C., Bart...Bury St. Edmunds
Bunbury, Henry M....Marlston House, Newbury
Bunning, T. W....34, Grey St., Newcastle-on-Tyne
Bunny, Capt. Edward John...Slinfold, Horsham
†Bunsen, G....Bourg-Rheindorf, Bonn, Prussia
Burbery, J. J....Crofts, Alveston, Stratford-on-Avon
Burchnall, Samuel...Catton, Burton-on-Trent
Burd, Thomas A....Burcot, Wellington, Salop
Burden, Rowland...Castle Eden, Stockton-on-Tees
†Burdett, E....Manor Farm, Lyvedon, Thrapstone
Burdon, George...Heddon Ho., Newcastle-on-Tyne
Burgess, Capt. H. W....
Burgess, John...Druid's Lodge, Redruth
Burgess, John...Edenham, Bourne
Burgess, Robt....Winterbourn, Zelstone, Blandford
Burgess, William...95, Newgate Street, E.C.
Burgoyne, Sir J. M., Bt...Sutton Park, Potton, Beds
Burkill, E. W....Winteringham, Brigg
Burley, John Henry...Rutland Street, Leicester
Burley, William...Rutland Street, Leicester
Burley, W. Robinson...Rutland Street, Leicester
Burn, Robert Scott...Heaton Mersey, Manchester
Burn, William...Broomhill, Acklington
Burnard, Chas. F....Compton Villa, Plymouth
Burnell, Edward...Shudy Camps, Cambridge
Burnell, E. P....Winkburne Hall, Southwell, Notts
Burnett, David...Ashley, Stockbridge, Hants
†Burnett, Francis...Kingscote, Wotton-under-Edge
Burnett, Gregory...Dee Cottage, Flint
Burney, George...Millwall, E.
Burnham, Robert...Leicester
†Burniston, Rich....Greenlands, Henley-on-Thames
†Burr, Daniel Higford...23, Eaton Place, S.W.
Burrard, Sir George, Bt...Walhampton, Lymington
†Burrell, Charles...Thetford
Burrell, J....3, High Swinburne Pl., Newc.-on-Tyne
Burrell, Robert...Palace Green, Durham
†Burrell, R....Westley Hall, Bury St. Edmund's
Burrell, Walton, jun...Bury St. Edmunds
Burroughes, H. N...Burlingham Hall, Norwich
Burroughes, Rev. J....Lingwood Lodge, Norwich
Burroughes, Rev. R....Hoveton Hall, Norwich
Burroughes, Rev. T....Gazeley, Newmarket
Burrows, Richard...Ruddington, Notts
Burrows, T. Ash...Normanton-on-Trent, Newark
Burt, Henry...6, St. Mark's Sq., Regent's Pk., N.W.
†Burt, H. C....Witchampton, Wimborne
†Burton, John...Gresford, Wrexham
Burton, R. H. L....Chilton Grove, Shrewsbury
Burtt, J. B....Kettering
Bury, Charles...Snows, Nazing, Essex
†Bush, John W....
†Bushby, H. Jeffreys...Alton Lodge, Roehampton
Bushell, William...Poulton, Wingham, Kent
†Busk, Joseph...Codicote Lodge, Welwyn
Butcher, W....Bowling Green Farm, Ewell
†Butler, Hon. C. L...Coton House, Rugby
Butler, Capt. G. C...1, Harcourt Buildings, Temple
Butler, Capt. J....Kirby Ho., Inkpen, Hungerford
†Butler, Paul...Down Ampney Ho., Cricklade, Wilts
Butler, Richard...Ratcliffe-on-Trent
†Butler, Wm....Badminton, Chippenham
Buxton, W....Lime Tree Lodge, Rotherhithe, S.E.
Byrd, Charles...Littywood, Stafford
Bywater, R. F....Coniston, Ambleside

C.

Caborn, Richard S....Denton, Grantham
Cabrera, Gen. (Ct. de Morella)...Wentworth, Chertsey
Cadle, Clement...Clarence Street, Gloucester
Cadle, John...Ballingham Hall, Ross
†Cadle, Thomas...Longcroft, Westbury-on-Severn
Cadogan, Mrs....Brenkburn Priory, Morpeth
Cafferata, William...Newark, Nottingham
Caffin, Peter...Worth, Sussex
Caines, James...Cheselborne, Dorchester, Dorset
Caird, Jas....Baldoon, Newton Stewart, N.B.
†Calcraft, J. H., M.P....Kempstone, Corfe Castle
Caldecott, C. M....Holbrook Grange, Rugby
†Caldecott, Thos...Rugby Lodge, Rugby
Caldwall, Bonham...Leominster
Caldwell, H. B....Monkton Farleigh, Wilts
†Caless, Wm....Bodicote House, Banbury
†Calthorpe, Lord...Perry Hall, Stafford
†Calverley, C. C....44, Charlotte Sq., Edinburgh
†Calvert, Frederic...5, Tilney Street, Park Lane
Calvert, Dr. F. C....Gibbon Street, Bradford
†Calvertt, J. S...Tothill Manor House, Alford, Linc.
†Cameron, A. H. F....Deane Villa, Liverpool
Cammell, C....Norton Hall, Sheffield
Camp, James...Ilfracombe
Campain, Joseph George...Cowbit, Spalding
Campain, S. W....Deeping St. Nicholas, Spalding

Campbell, Sir A. T. C., Bart.. Wyseby, Ecclefechan
Campbell, Charles Lee, Thurstaston Hall, Birkenhd.
Campbell, R.... Buscot Park, Lechlade
Campion, Wm. J.... Danny, Hurstpierpoint
Camps, Henry... Salterley Grange, Cheltenham
Camps, Wm.... 40, Park St., Grosvenor Square, W.
Cane, Edward... Berwick, Lewes
Cane, Rev. T. C.... Southwell, Notts
Canning, George H... Shottery, Stratford-on-Avon
Canning, Wm. Browne... Elston, Devizes
Cannon, John Henry... Beckley, Oxford
Cantrell, Charles Seaward... Riding Court, Datchet
Cantrell, H.... Bayliss Court, Slough
†Capel, Arthur... Bulland Lodge, Wiveliscombe
Capel, Wm.... The Grove, Stroud, Gloucestershire
Capper, R. Harcourt... N. Gate, St. Weonard's, Ross
Carding, F... Combs Farm, Farnsfield, Southwell
Cardus, T.... Barwell Court, Kingston, S.W.
†Cardwell, E. H.... 11, Cromwell Place, W.
†Carew, R. Russell... Carpender's Park, Watford
†Carew, Thomas... Collipriest House, Tiverton
†Carew, W. H. Pole... Antony House, Devonport
Carey, Arthur... Rochford
Cargey, Gilbert... Kiplin, Catterick
†Carleton, Hon. and Rev. R.... 24, Grosvenor Place
Carlin, Wm., jun.... Marsh Cott., Keyingham, Hull
Carlisle, Edward... Penrith
†Carnegie, David... Eastbury, Watford
Carnegie, Hon. J. J.... Fair Oak, Petersfield
†Carpenter-Garnier J... S. Sydenham, Tavistock
Carr, William... Stackhouse, Settle
Carrick, William, jun.... Tarn Lodge, Carlisle
†Carrington, T. S. Townsend.. Faton, Uttoxeter
Carrington, William T.... Hollington, Uttoxeter
Carrol, W. Hutchinson... Tulla House, Nenagh
Carson, James... Springfield, Great Marlow
Carson, J. A.... La Belle Sauvage Yard, Ludgate Hill
†Carter, John Bonham, M.P.... Adhurst St. Mary's
Carter, M. F.... Newnham, Gloucester
Carter, Richard H.... Upton Grove, Tetbury
Carter, William... Boughton Blean, Faversham
Cartwright, G. K.... Camborne Veor, Cornwall
†Cartwright, Col. H., M.P.... Kineton, Warwick
Cartwright, John... Craycombe House, Pershore
Cartwright, John... Oadby, Leicester
Cartwright, Richard Aubrey... Edgcott, Banbury
†Cartwright, R. Norton... Newbiggin, Morpeth
Cartwright, T.... Pillar Farm, Dunston, Lincoln
Cartwright, T. L. M.. Newbottle Manor Ho., Brackley
†Cartwright, T. W... Ragnall Hall, Newton, Newark
Cartwright, Gen. W.... Weedon
†Cartwright, W. G., M.A... Newport, Monmouths.
Cartwright, W. S... Stow House, Newport, Mon.
Carver, Robert... Ingarsby, Leicester
†Case, J. B... Poulton Hey, Bebbington, Birkenhead
Case, Thomas H.... Testerton Hall, Fakenham
Casswell, George... Gosberton, Spalding
Casswell, John Henry... Laughton, Folkingham
Castellain, Alfred... Liverpool
Castree, Josiah... College Green, Gloucester
Catchpool, Edward... Feering Bury, Kelvedon
Catchpole, Thomas... Hawstead, Bury St. Edmund's
Cater, J. W.... West Lodge, Barnet, N.
†Cathcart, R... Pitcairlie Ho., Auchtermuchty, Fife
Catlin, R. Edgar... Hemberston Road, Leicester
Cator, Maj.-Gen. (R.H.A.).. Arsenal, Woolwich, S.E.
†Caulfield, St. George... Donamor Cas., Roscommon
Causton, Joseph... Champion Hill. Camberwell, S.
†Cavan, Col. P. C.... Longparish, Whitchurch, Hants
Cave, Henry Haddon... Desborough, Kettering
Cavendish, Lt.-Col. W. H. F... West Stoke, Chichester
Cawdor, Earl of... Stackpole Court, Pembroke
Cawley, Thomas... Nantwich
Cawton, Wm. J.... Park Hall, Chesterfield
Cayley, Sir Digby, Bart.... Brompton, York
Chadwick, E., C.B.... 5, Montague Vil. Richmond, Sur.
†Chadwick, Elias... Pudleston Court, Leominster
†Chadwick, F.... The Hermitage, Grimsargh, Preston
Chadwick, Joseph... Holme Cottage, Kirkstall, Leeds
Chadwick, T.... Wilmslow Grange, Cheshire
Chadwick, William... Burlish Lodge, Stourport
†Chafy, Westwood W.... Bowes House, Ongar
Chalcraft, H.... Millhall Cottage, Alton
Chalcraft, William... Bramshot House, Liphook
Chalk, Thomas... Barbourne, Worcester
Challenor, John... Blackwood, Leek
Chaloner, Capt. Thos., R.N... Longhull, Guisboro.
Chamberlain, Henry, jun... Bredicot Court, Worcester
Chamberlain, H. B.... Ivy House, Desford, Leicester
†Chamberlayne, Thos.... Cranbury Pk., Winchester
Chambers, George... High Green House, Sheffield
Chambers, John... The Hurst, Tibshall, Alfreton
Chambers, P. H... Llysmeirchion, Trefnant, Rhyl.
Chambers, Thomas, jun.... Colkirk Hall, Fakenham
†Chambers, Wm.... Hafod, Rhayader
Champion, Wm. W.... Calcot, Reading
Champney, Felix... Gatwick, Crawley, Sussex
Champneys, Rev. T. P.... Badsworth, Pontefract
Chandler, Henry... Salford, Manchester
Chandler, Thomas... Aldbourne, Hungerford
Chapman, R. H.... Upton, Nuneaton
Chapman, Thos... 14, Cockspur St., Charing Cross, S.W.
Chapman, Capt. W. H.... Humberstone, Leicester
Chapman, William... 1, Neale Street, Ipswich
Chapman, William... Apethorpe, Peterborough
†Charlemont, Earl of... Charlemont House, Dublin
Charles, James... Home Farm, Hursley Pk, Winchester
†Charlesworth, J.... Headfield, Dewsbury, Yorkshire
†Charley, Richard... Cleobury North, Bridgenorth
†Charlton, St. John... Hillfields, Bewdley
†Charlton, St. J. C... Apley Cas., Wellington, Salop
Charlton, W. H.... Hesleyside, Hexham
Chase, Henry... Stanton Hall, Ixworth, Suffolk
Chasemore, Philip... Horsham, Sussex
Chawner, Henry... Hound Hill, Uttoxeter
Chawner, Richard... Hare Hill, Doveridge, Derby
†Chawner, Richard Croft... The Abnalls, Lichfield
Cheatle, T. Farmer... Dosthill, Tamworth
Checkland, George... Park Ho., Knighton, Leicester
Cheere, Rev. Frederic... Ingham, Bury St. Edmunds
Cheesman, Frederick... Little Chart, Ashford
Cheffins, Henry... Little Easton Manor, Dunmow
Cheney, Edward.... Gadsley Hall, Melton Mowbray
Cheney, R. H.... Badger Hall, Shiffnal, Shropshire
†Cherry, Geo. Charles... Denford House, Hungerford
Chesterfield, Countess of.. Bretby Hll., Burton-on-Trent

Chesworth, Joseph...Longslow, Market Drayton
Chetwode, Sir J. N. L., Bart.... Market Drayton
Chetwynd, Hon. Charles C....Beechland, Uckfield
Chetwynd, Sir G., Bart...Grendon Hall, Atherstone
Chetwynde, Major W. F....Brocton Hall, Stafford
Chichester, Bishop of...The Palace, Chichester
Chick, John...Compton Valence, Dorset
Chick, John...Whitwell, York
Chick, Thomas...Stratton, Dorchester, Dorset
Child, Thomas...Slinfold, Horsham
Chinery, John...Wootton Milton, Lymington
Chittenden, James...Hope All Saints, New Romney
Chittenden, John...Newchurch, New Romney
Chitty, Edward...Guildford
†Cholmondeley, Lord H....Holly Hill, Southampton
Cholmondeley, Col. Hon. G...Abbott's Moss
Christian, John...Barrow House, Oakham
Christy, James, jun....Boynton Hall, Chelmsford
Church, John...Woodside, Hatfield
†Churchill, George...Aldershott, Fordingbridge
†Churchill, Lord...
Churchill, H....Barton Ho., Morchard Bishop, Devon
†Churston, Lord...Lupton, Torquay
†Churton, John...Foregate Street, Chester
Chute, W. L. Wiggett...The Vyne, Basingstoke
Clare, Charles L....Higher Broughton, Manchester
Clare, W. Harcourt...Twycross, Atherstone
†Clarance, John...14, Billeter Street, City
†Clarina, Lord...Elm Park, Limerick, Ireland
Clark, Geo. Wm....6, Belgrave Pl., Tunbridge Wells
Clark, Rev. John Crosby...Chertsey
Clark, John Webster...Belvoir Street, Leicester
Clark, Joseph H....Attwood House, Maidenhead
Clark, Richard...Barne St. Budeaux, Plymouth
Clark, Thomas...Derndale, Hereford
Clark, William...Luney Barton, St. Ewe, Cornwall
Clark, William J....
†Clarke, C....Ashby-de-la-Lound, Sleaford, Linc.
Clarke, Edw. S....Glebeland House, Lee, Kent
Clarke, G. R....Chesterton Lodge, Bicester
Clarke, John...The Roos, Saffron Walden
Clarke, J. Goffe...Brackley, Northampton
Clarke, John Algernon...Long Sutton
Clarke, Jno. Sanders...Pratling Hall, Lutterworth
Clarke, Jno. William...Guisborough, Yorkshire
Clarke, Nathaniel...Beamish Park, Fence Houses
Clarke, Robt. B....Haynes Hill, Barbadoes
†Clarke, T. E....Tremlett House, Wellington, Som.
Clarke, Thomas T....Swakeleys, Uxbridge
Clarke, William...Brack Farm, Luton
Clarke, W. Barwick...Barwickstead, Whitehaven
Clarkson, Rev. T. L....South Elmham, Norfolk
†Clavering, Sir W., Bt...Univ.Club, Suffolk St., S.W.
Clay, Charles...Walton Grange, Wakefield
Clay, Charles, Whitchurch, Salop
Clay, Geo. P....Guildhall St., Bury St. Edmund's
†Clay, Sir W., Bart....Fulwell Lodge, Twickenham
Clay, William D....
Clayden, John...Littlebury, Saffron Walden
Clayden, John Carter...Littlebury, Saffron Walden.
Clayton, E. E....Guildhall St., Bury St. Edmund's
Clayton, David S....Norbury, Stockport
Clayton, John...Newcastle-on-Tyne
†Clayton, Nathaniel...Melville Street, Lincoln
Clayton, R. C. B....Glanywern, Denbigh
Clayton, T. G....Ousecliffe, York
Cleasby, R. H....Broomside House, Durham
Cleasby, Thomas M....Wilton Grange, Redcar
Cleave, Benjamin W....Newcombe House, Crediton
Clements, C. F....53, Brunswick Road, Brighton
Clements, Sam....Chequer Squ., Bury St. Edmund's
†Clerk, E. H....Burford, Shepton Mallet, Somersets.
Cliffe, Thomas...Crewe Gates, Crewe
Clifford, Henry Clifford...Frampton Court, Dursley
Clifford, Col. H. M....Llantilio, Cosseney, Ragland
†Clinch, Charles...Eagle Brewery, Witney
Clinton, Col. Fred....Ashley Clinton, Lymington
Clinton, Lord...HeantonSatchville, Beaford, N. Devon
Clive, George, M.P....Perrystone, Ross, Herefords.
Clive, Capt. Hon. W.W., M.P...53, Grosvenor St., W.
†Clonbrock, Lord...Clonbrock, Ahaserah, Ireland
†Clowes, Edmund...Carnforth, Lancaster
Clowes, George..Duke Street, Stamford Street, S.E.
Clowes, Wm...51, Gloucester Ter., Hyde Park, W.
Clutterbuck, Rev. J. C...Long Wittenham, Abingdon
Clutterbuck, R....Watford Ho., Watford, Herts
Clutterbuck, T...Warkworth, Acklington, Northumb.
Clutton, Henry...9, Whitehall Place, S.W.
Clutton, John... 9, Whitehall Place, S.W.
Clutton, Robert...Hartswood, Reigate, Surrey
Clutton, Robt. G....9, Whitehall Place, S.W.
Clutton, Wm....1, Portland Villa, Penge, S.E.
Clutton, Wm. James...The Mount, York
Coaker, George...Old Newnham, Plympton
Coatsworth, J..Layham's Fm., W. Wickham, Bromley
Cobb, Frederick...Walton, Warwick
Cobb, Geo. Henry...Austrian Lloyd's, Trieste
†Cobb, Henry...26, Lincoln's Inn Fields, W.C.
Cobb, Robert L....Higham, Rochester
Cobb, Thomas...Radnor Cliff Villa, Sandgate
Cobb, William Henry...Witham
Cobbett, John M....Skeynes, Edenbridge
Cobbold, John Chevallier, M.P....Ipswich
Cobon, James...Well Hall, Lynn, Norfolk
†Cochrane, A. H....Langton Grange, Darlington
Cochrane, James...Harburn, Edinburgh
†Cocks, Rev. C. R. Somers...Cleobury Mortimer
Cocksedge, James S....Stowmarket
Codd, Henry...Ashe, Micheldever
†Coke, Hon. E. K....Longford Hall, Derby
Coldham, H. W....Anmer, Lynn, Norfolk
†Cole, R. J...
Cole, Robert...Belmont House, Wragby
Cole, Thomas H...The Green Wick, Bath
Cole, Wentworth L...
Coleman, G. W., Great Glen, Leicester
Coleman, H. Septimus...Chelmsford
Coleman, John...Escrick Park, York
Coleman, John...Park Nook, Quorndon, Derby
Coleman, Richard....Langdon Abbey, Dover
Coleman, William...Bury St. Edmund's
†Coles, Alfred...Clifton Lodge, Clapham Park, S.
Coles, Walter...Bushy Lodge Farm, Waterford
Collier, W. F....Woodtown, Horrabridge, S. Devon
Collin, Rev. J., jun....Rickling Vicarage, Herts
Collings, Rev. William T....Guernsey

Collins, Barnabas...Hunston, Ixworth
Collins, Edward...Newton Ferrers, Callington
†Collins, Henry...Aldsworth Ho., Emsworth, Sussex
†Collins, John...Wonham, Bampton, Devon
Collins, Wm....Aston Farm, Stafford
Collison, William...Beverley
Collyer, Rev. Canon R...Warham Rect., Wells, Norf.
Colman, Thos. H....Rockland St. Peter, Attleborough
Colquhoun, J. C....Chartwell, Westerham
Colthurst, John...Chew Court, Chew Magna, Bristol
Colthurst, J. C....Huntworth Pk. Farm, Bridgwater
Colvile, Lieut.-Gen...Kempsey House, Worcester
Colvile, C. R., M.P...Lullington Hl., Burton-on-Tr.
Colville, W. E. A....Horningsheath, Bury St. Edm's
†Colvin, B. B...Monkhams Ha., Waltham Abbey, N.
†Colyer, William...North End, Crayford, Kent
Combe, R. H....Pierrepoint, Frensham, Farnham
Combermere, Visc...Combermere Abbey, Nantwich
†Compton, H. C....Lyndhurst, Hants
†Compton, R....Eddington House, Hungerford
†Condie, James...Perth
Coney, William...Battenhall, Worcester
†Congreve, S. B....Harboro' Magna, Rugby
†Congreve, T....Peter Hall, Brinklow, Coventry
†Congreve, W....
Conington, Clement...Hagworthingham, Spilsby
†Constable, Sir Clifford, Bt...Burton Constable, Hull
Constable, Rev. J....R. A. College, Cirencester
Conway, Wm. S....Bodryddan, St. Asaph's, Flints.
Cooch, John...Harleston, Northampton
Cook, George...Flitwick, Ampthill
Cook, John...Southgate St., Bury St. Edmund's
Cook, Richard Samuel...Street Fields, Lutterworth
Cooke, B. G. D....Colomendy, Mold
Cooke, Chas...Livermere Parva, Bury St. Edmund's
Cooke, Grimwood....Linton, Cambridgeshire
†Cooke, Henry...138, Widemarshe Street, Hereford
Cooke, James H....Berkeley Castle, Gloucestershire
Cooke, Rev. James Y....Semer, Ipswich
Cooke, Robert C....Livermere, Bury St. Edmund's
Cooke, William...Stanford, Worcester
Cooke, Wm. R....Rickenhall, Botesdale, Suffolk
†Cooke, Wm. Fothergill...
Cookes, Jno. M....32, Warwick St., Leamington
Cookes, Jno. R....Wood House, Stourport
Cookson, W. J...Eslington Park, Alnwick
Coombs, T....South Street, Dorchester, Dorset
Cooper, Alfred Allen...Welford Place, Leicester
Cooper, Benjamin...Pattingham, Wolverhampton
†Cooper, C. B....Fakenham Hall, Ixworth
Cooper, E. H., M.P..Markree Castle, Collooney, Sligo
Cooper, G. Kersey...Euston, Thetford
Cooper, Henry Reeve...Britwell, Watlington, Oxon.
Cooper, J. R...Barton, Bury St. Edmund's
†Cooper, N. J....Westgate, Mansfield
Cooper, Robert...The Bank, Bury St. Edmunds
Cooper, Thomas W....Bury St. Edmunds
Cooper, W. W....Barnham, Thetford
Coote, Geo. Cosens...Tortington, Arundel
Copeman, George...Dunham Lodge, Swaffham
Copeman, R....Hemsley Lodge, Great Yarmouth
Copestake, Thos. G....Brailsford, Derby
†Coppard, T....Lanehurst Lodge, Hurstpierpoint
Corbet, H....Farmers' Club, Salisbury Square, E.C.
†Corbet, H. R....Adderley Hall, Market Drayton
Corbett, James...Croome Dabitop, Severn Stoke
Corbett, Capt. R. J....Cirencester
Corbett, Thomas...Shrewsbury
Corner, Edward...Esk Hall, Whitby
Corner, J. B....Longforth, Wellington, Somerset
Cornes, James...Barbridge, Nantwich
Cornewall, Sir V., Bart....Moccas Court, Hereford
Cornish, G....Risby Gate St., Bury St. Edmund's
Corringham, R. W....Lound House, Haxey, Bawtry
Coryton, A....Pentillie Castle, Saltash, Cornwall
Cosens, William...Langdon, Dawlish, Devon
Costerton, Charles Fisher...Scole
Cother, William...Middle Aston, Woodstock
Cottam, George H....Old St. Pancras Road, N.W.
†Cotterell, Sir H. G. Bart....Garnons, Hereford
†Cotterell, Jacob Henry...6, Terrace Walks, Bath
Cottingham, John G....Chatsworth, Chesterfield
†Cotton, Alexander...
Cotton, Gen. F. Conyers...Cilhendre, Rhuabon
Cotton, H....Amor Hall, Washbrook, Ipswich
Cotton, H. P....Quex Park, Isle of Thanet
†Couchman, C....Temple, Balsall, Birmingham
Couchman, J. W....Tottenham Green, N.
Coulman, Edward...The Levels, Thorne, Doncaster
Coulman, John...Red House, Thorne
Coultas, James....Spittlegate, Grantham
†Coulthard, G....Lanercost Abbey, Brampton, Cum.
Coupland, John G....Freeston, Boston
†Court, P. Simpson...140, Snargate Street, Dover
Courthope, G. C....Whiligh, Hurst Green
Coussmaker, Lannoy...Westwood, Guildford
Coventry, Earl of...Croome Court, Kempsey
†Cox, Henry...Trevereux, Edenbridge, Kent
Cox, Samuel Walker...Spondon Cottage, Derby
Cox, William...Brailsford, Derby
Cox, W. S...Sansom Wood, Calverton, Nottingham
Cox, Wm. Thos., M.P....Spondon Hall, Derby
†Coxe, James...Newtown Lodge, Hungerford
Coxon, John...Freeford Farm, Lichfield
Coyney, C....Weston Coyney, Longton, Staffordsh.
Craigie, P. G....Brawith Hall, Thirsk
Crane, Edward...Forton, Montford, Shrewsbury
Crane, James...Tolpuddle, Dorchester
Crane, James...Shrawardine, Salop
†Cranfield, William...Buckden, Huntingdon
Cranke, John...Fountain Street, Ulverston
†Cranston, Thomas...Little Dilwyn, Leominster
Crawford, Miss E. A...Hill Ho., Farnsfield, Southwell
Crawford, John...Lumley Park, Fence Houses
Crawford, Rev. W. H....Haughley Park, Woolpit
Crawford, Wm. H....Lakelands, Cork
Crawhall, Isaac...The Priory, Nun Monkton, Yor.
†Crawley, John, jun...Gosberton Fen, Spalding
†Crawley, J. R....Melchbourn, Higham Ferrers
†Crawley, John S....Stockwood Park, Luton
Crawley, Lewis...Keightley House, Holbech
†Crawshay, Edwd...Orthorpe Ho., Market Harboro'
Creese, William...Teddington, Tewkesbury
Cressingham, Jonah...Carshalton, S.
Cresswell, A. J. Baker...Cresswell, Morpeth
Cresswell, Mrs. Gerard..Appleton Hall, King's Lynn

Creswell, R. W....Ravenstone, Ashby-de-la-Zouch
Crewe, Sir J. H., Bart....Calke Abbey, Derby
Crewe-Read, Capt., R.N...Llandinam Hall, Mont.
Crickmore, Robert...Ingloss, Loddon, Norfolk
Crickmore, W...Seething, Brooke, Norfolk
Cripps, H. W....Parmoor, Henley-on-Thames
Crisp, Arthur Wm...Gedgrave Hall, Wickham Mkt.
Crisp, Edwards, M.D....42, Beaufort Street, S.W.
†Crisp, Thomas...Butley Abbey, Wickham Market
†Croft, A.H..Aldborough Hll.,Boroughbridge,Yorks.
Croft, Ven. Archdeacon J....Saltwood, Hythe, Kent
†Croft, Sir John, Bart....Kingsdown, Sittingbourne
Croft, J....Dalton Ho., Saddington, Mkt. Harboro'.
†Crofton, Lord...Mote Park, Athlone, Ireland
†Crofts, Rev. C. D....Caythorpe Rectory, Grantham
Crofts, John...Long Lawford Hill, Rugby
Crompton, George...Chesterfield
Croome, J. Capel...Bagendon House, Cirencester
†Cropper, E. Wm....Thornton Fields, Guisborough
Crosbie, Wm. T....Ardfert Abbey, Tralee, Ireland
Crosby, J. M....73, Newboro' Street, Scarborough
Crosland, Jabez...Clumber Street, Nottingham
†Cross, Wm. A....Red Scarr, Preston, Lancashire
Cross, John...Broad Street, Bury, Lancashire
Crosse, Thomas B....Shaw Hill, Chorley
Crosskill, Alfred...The Iron Works, Beverley
†Crossley, Sir F., Bt., M.P...Somerleyton, Lowestoft
†Crow, G....Ornhams, Boroughbridge, Yorkshire
Crowe, Daniel...Gaywood, King's Lynn
Crowley, John L....Standford Hall, Newport, Salop
Croxon, John...Llanvorda Isaf, Oswestry
†Crump, G. W...Woollas Hill, Eckington, Pershore
Crundwell, G....4, The Crescent, Pk. Town, Oxford
Crutchley, P. H....Sunninghill Park, Staines
Cuff, J. H....New Cattle Market, Islington, N.
†Cuff, W. Fitchett...Merriott, Taunton
Culley, George...Fowberry Tower, Belford
Culley, John...Easton, Pewsey, Wilts
Cumberbatch, L....Queen's House, Lyndhurst
†Cumming, L....Ratten, Thurso, N.B.
Cunninghame, Capt. R. D. B..Hensol, Castle Douglas
†Cure, Capel...Blake Hall, Ongar, Essex
Cureton, George...Beam House, Shrewsbury
Currie, Edmund...West Burton House, Petworth
Currie, Henry...West Horsley Park, Leatherhead
Currie, Raikes...Minley Manor, Farnboro'
Curtis, Charles E....Alton
Curtis, Frederick Thos...Elmstone Court, Sandwich
Curtis, Thomas...The Hall, Berkhamstead
†Curtis, Sir Wm., Bart....Caynham Court, Ludlow
Curtler, T. G....Beverè House, Worcester
Curzon, Hon. S. C. H. R....Grove Ho., Tooting, S.
Cust, Capt. F. Henry...Ellesmere
Custance, Hambleton F....Weston House, Norwich
Cuthbert, Robert...Newton-le-Willows, Bedale
†Cuthbert, William...Beaufront, Hexham
Cutting, Robert Coote...Ridlington, Uppingham

D.

Dacre, Lord...The Hoo, Welwyn, Herts
†Dacre, Henry...Auckland, New Zealand
†Dacre, Joseph...Kirklinton Hall, Carlisle
Dain, M. John...St. Martin's, Leicester
Daintree, J. O...The Grange, Lolworth, St. Ives
Dalgairns, William...Rosaire, Guernsey
Dalton, James...Fillingham Manor, Lincoln
Dalton, Rev. R...Kelmarsh, Northampton
Dalton, Thomas...Cardiff
Danby, Francis...Middledale, Driffield
Daniel, Thomas...Stoodleigh, Tiverton
†Darbishire, S. D....Pendyffryn, Conway
Darby, George...Marklye, Warbleton, Hurst Green
†Darby, Abraham...Stoke Court, Slough
Darley, Chas. Albert...Burtonfield, York
†Darling, J....Beau Desert, Rugeley
Darling, Robt....Plawsworth, Fence Houses
Darnbrough, Thos. S....South Otterington, Thirsk
†Dashwood, F. Loftus...Kirtlington Park, Oxon
Dashwood, Sir Henry W., Bt....Kirtlington, Oxford
†Dashwood, M....22, Park Lane, W.
Daubeny, Rev. E. A....Ampney, Cirencester
Daubeny, R....2, King's Bench Walk, Temple, E.C
Davey, Charles M....Witham
Davey, H. M....North Street, Colchester
Davey, J. S....Redruth, Cornwall
Davey, Richard, M.P....Redruth, Cornwall
David, Edward...Llandaff
David, Evan William...Radyr Court, Cardiff
Davie, Sir H. Ferguson, Bt., M.P...Creedy, Crediton
Davie, J. Thornton...Hepscott Red House, Morpeth
Davies, Benjamin...Hayton House, Chorley
Davies, D. Price...Troedybryn, Llandilo
†Davies, E. H....
Davies, Rev. J....Moor Court, Kingston, Herefordsh
Davies, John Morgan, Froodvale, Llandilo
Davies, Robert C....Southminster, Maldon
Davies, Robert J., Cwrtmaur, Llangeitho, Lampeter
†Davies, Robt. P....Ridgeway, Narberth, S. Wales
Davies, Mrs. Susannah...Rochaveston Manor, Notts
Davies, Thomas...Burlton Court, Burghill, Hereford
Davis, Henry...Old Downs, Oakhill, Bath
Davis, James...Melcombe Horsey, Blandford
Davis, Peter...Bickmarsh Hall, Alcester
†Davis, R....9, St. Helen's Place, Bishopsgate, E.C.
†Davis, R. F....
†Davis, R. S. B....Swerford Park, Enstone, Oxon
†Davis, Samuel...Swerford Park, Enstone, Oxon
Davis, T....Little Wenlock, Wellington, Shropshire
Davison, John Perry...Easton Maudit, Northampton
Davison, Richard...Driffield
Davison, Joseph...Greencroft Park, Durham
Davy, Jas....Flitton-Barton, North Molton
Davy, John T....Barton Roseash, South Molton
Dawes, John S....Smethwick House, Birmingham
Dawkins, E. H. F....Moggerhanger Ho., St. Neot's
Dawson, Edward...Aldcliffe Hall, Lancaster

Dawson, J....Gronant, Rhyl, Flintshire, N.Wales
†Dawson, Wm. Edward..Plumstead Common, S.E.
†Day, Charles...Colleyweston, Stamford
Day, H. Morgan...Langham, Bury St. Edmund's
Day, John...Newick Lodge, Uckfield
Day, Richard...Hodroyd Hall, Barnsley
†Day, Nevile...Easton, Stamford
†Day, Samuel...St. Neot's
Day, Thomas...22, Dorset Street, Baker Street, W.
†Day, William...Woodyates, Salisbury
Daymond, Rev. A....Albert College, Framlingham
†D'Azy, Count Benoist...88, Rue de Grenelle, Paris
†Deacon, John...Mabledon, Tonbridge
†Dean, A. K....East Brent, Axbridge, Somerset
†Dean, F. K....East Brent, Axbridge, Somerset
Dean, Thomas...Mold
Deane, F. H....Eastcote House, Watford
†De Curzay, Visct...Château de Curzay, Lusignan
Deedes, Lieut.-Col. Wm....Sandling Park, Hythe
†Dees, James...Flora Villa, Whitehaven
†Dees, Robert R....Wallsend Hall, Newcastle-on-T.
†De L'Isle and Dudley, Lord..Penshurst Park, Kent
Delves, William...Frant, Tonbridge Wells
De Mauley, Lord...Down Ampney, Cirencester
†Demidoff, Prince...Florence
Denchfield, J....Aston Abbotts, Aylesbury
Denison, Edmund...Doncaster
†Denison, Sir W., K.C.B....
Denman, Lord...Middleton Hall, Bakewell
Denne, W....Three Counties Asylum, Arlesey, Beds.
†Dennett, Mullens...Lodsworth, Petworth, Sussex
Dennis, Henry...Hafod-y-bwch, Rhuabon
Denson, Samuel...Pwllhalog Hall, Rhyl, Flints
†Dent, John Coucher...Sudely Castle, Winchcombe
Dent, John D., M.P....Ribstone Hall, Wetherby
Dent, Joseph...Ribstone Hall, Wetherby
Dent, Joseph...Neasham Hall Farm, Darlington
Dent, Ralph...Streatham Castle, Barnard Castle
†Dent, Wilkinson..Flass Ho., Kirkby Thore, Penrith
Denton, A. Bailey....Stevenage, Hertford
Denton, Edward H...Gt Barton, Bury St. Edmund's
Denton, Henry...Wolverhampton
Derham, William...Tottenham
De Rothschild, Sir A., Bt....Aston Clinton, Tring
De Salis, Rev. H. J....Fringford Rectory, Bicester
Des Vœux, Sir H., Bt....Drakelow Pk., Burton-on-Tr.
†De Trafford, Sir H., Bt...Trafford Pk., Manchester
Devas, Charles F....Bromley Lodge, Kent, S.E.
Devas, Horace...Spondon Hall, Derby
Devas, Thomas....Mount Ararat, Wimbledon, S.W.
Devas, William...Woodside, Old Windsor
Deverell, John...Purbrook Park, Portsmouth
†De Vitre, H. D....Charlton House, Wantage
†Devon, Earl of...Powderham Castle, Exeter
Devon, Chas...St. Vincent's, Addington, Maidstone
Dew, Tomkyns...Whitney Court, Hereford
Dewdney George...Baccamoor, Plympton
Dewe, Wm. T....Manor House, Coates, Cirencester
De Wend, Wm. Fenton...Croft Lodge, Leominster
†De Wezele, Count G....55, Eaton Square, S.W.
†Dewing, R ...Carbrooke, Watton, Norfolk
De Winton, Capt. Thos....Wallsworth Hl., Glo'ster
Deykin, James, jun....Whiston, Penkridge
Diamond, James....Beer Alston, Tavistock
Dicken, Thomas, jun....Colton Hall, Rugeley
†Dickins, Charles Scrace...Horsham, Sussex
Dickin, John...Tyndwfr, Llangollen
Dickin, Richard....161, Old Road, Stockport
Dickin, Wm....The Lloyd, Market Drayton.
Dickinson, G. T....Newcastle-on-Tyne
†Dickinson, E. H....Berkeley, Frome
Dickinson, John...Abbott's Hill, Watford, Herts
Dickinson, William...New Park, Lymington
†Dickons, Thomas...High Oakham, Mansfield
Dickson, Arthur....Queen's Park, Chester
†Dickson, G. A....Chester
Digby, G. D. Wingfield...Sherborne Castle, Dorset
Digby, Lord...Minterne House, Dorchester, Dorset
Digby, Rev. K...Tetteshall Rectory, Litcham, Norf.
†Dilke, Sir C. W., Bt., M.P....76, Sloane St., S.W.
†Dilke, Charles W....76, Sloane Street, S.W.
†Dinning, J...Adderstone, Belford, Northumberland
Dinning Joseph...Langley Hill Top, Haydon Bdge.
Disney, Edgar...The Hyde, Ingatestone
Disraeli, Rt.Hn. B., M.P...Hughenden Man., Bucks
Divett, John...Bovey Tracey, Devon
†Dixon, George M....Bucknowle House, Wareham
Dixon, Henry...Frankham, Tunbridge Wells
Dixon, H.Hall...8, Warwick Gdns., Kensington, W.
Dixon, Hugh...5, India Buildings, Liverpool
Dixon, J. T....Cambo, Newcastle-on-Tyne
†Dixon, John W...Caistor, Lincolnshire
Dixon, Thos. John...Holton, Caistor, Lincolnshire
†Dixon, Thos. Parkinson...Caistor, Lincolnshire
Dixon, Wm. F....Page Hall, Sheffield
Dobell, G. C....10, North John Street, Liverpool
Docker, Ludford...Paul's Hill, Leigh, Tunbridge
†Dod, Whitehall...Llannerch Park, St. Asaph
Dods, T. P....Anick Grange, Hexham
†Dodson, Charles E....Littledale Hall, Lancaster
†Doggett, Arthur...Newnham, Baldock
Doggett, Thomas William...Sandon, Royston
†Doneraile, Viscount...Doneraile Court, Co. Cork
Donkin, Samuel...Bywell, Felton, Northumberland
†Donovan, George (49th Regt.)...
Donovan, J. C...
Dorrell, Thomas...Bishampton, Pershore
Dorrington, C....Bridehall Farm, St. Albans
Dormer, C. Cottrill...Rousham, Woodstock, Oxon
Doubleday, E....Long Clawton, Melton Mowbray
Dowden, Thomas...Roke Farm, Bere Regis
†Dowdeswell, A. C....Pull Court, Tewkesbury
Dowdeswell, G. M...Park Gate Ho., Catsfield, Battle
†Dowdeswell, W. E., M.P....Pull Court, Tewkesbury
Dowding, Edwyn...15, Vineyards, Bath
Downing, J. B....Holme Lacey, Hereford
Downing, Isaac...Turner's Hill, Rowley Regis, Dudley
Downs, J. H....Grove Lodge, Fulham, S.W.
Downward, Rev. George R....Shrewsbury
Dowsett, Herbert...Park Farm, Pleshey, Chelmsford
Drake, Sir T. T. F. E., Bart...Nutwell Court, Exeter
†Drake, T. Tyrwhitt...Shardloes, Amersham
Drakeford, David...Brookside, Crawley, Sussex
Draper, Charles....Clinton House, Kenilworth
†Drax, J.S.W.Erle, M.P...Charborough Pk. Blandford
†Drew, Edw...Calcot, Kingscote, Wotton-under-Edge

Drew, James...Artiscombe, Tavistock
†Drewe, E. Simcoe..The Grange, Honiton
†Drewitt, George...Manor Farm, Oving, Chichester
Drewitt, Henry...Milvill Farm, Titchfield
Drewitt, John...North Stoke, Arundel
†Drewitt, R. Dawtrey...Peppering, Arundel
Drewitt, Thomas...Piccard's Farm, Guildford
Drewry, G...Holker Ho., Grange-in-Cartmel, Lanc.
Driver, Robert Collin....4, Whitehall Place, S.W.
†Druce, A. F. Milton....Burghfield, Reading
†Druce, Joseph...Eynsham, Oxford
†Druce, Samuel...Eynsham, Oxford
†Druce, S. Benj. L....New University Club, S.W.
Drydon, Thomas...The Kennels, Haydon Bridge
Ducane, Chas., M.P....Braxted Park, Witham
Duckering, R. E....Northorpe, Kirton Lindsey
Duckham, T....Baysham Court, Ross, Herefordshire
†Duckworth, Sir J., Bart....Wear House, Exeter
†Duckworth, Russell...Murtrey Hill, Frome
Dudding, Thomas...Pockerby, Goole
Dudgeon, J....Pearcelands, W.Hoathly,E.Grinstead
Dudfield, Benjamin....Kinlet, Bewdley, Salop
Dudin, John B....Hayes Grove, Bromley, S.E.
Duff, Alex. M....Gallowtree Gate, Leicester
Duffield, James...Great Baddow, Chelmsford
Dufty, Thomas...Knapthorpe, Newark
Dumas, Francis Kuper...25, Fenchurch Street, E.C.
Dumbrell, James....Ditchling, Hurstpierpoint
Duncan, W. G....Bradwell House, Stony Stratford
†Duncombe, Hon. O.,M.P....Waresley, Biggleswade
†Duncombe, Sir P. P., Bart....Bletchley, Bucks
†Dun, Finlay...Weston Park, Shipston-on-Stour
†Dunn, Thomas...1, York Gate, Regent's Pk., N.W.
†Dunn, Wm. H....Inglewood, Hungerford
†Dunne, Thomas...Bircher, Leominster
Duplessis, Jules...Newtown Park, Lymington
Du Pré, C. G., M.P....Wilton Park, Beaconsfield
Dupuis, Rev. G. J...Eton College, Windsor
Durant, Richard...Sharpham, Devon
Durham, Makin...Thorne, Yorkshire
†Duval, Fernand R.....16, Place Vendôme, Paris
Dyke, Francis Hart...3, Museum Street, York
Dyke, Sir P. H., Bart....Lullington Castle, Dartford
Dyott, Col., M.P....Freeford Manor, Lichfield
Dyson, Robert....Whiston Grove, Rotherham

E.

Eagle, Alfred...Boxted, Bury St. Edmund's
Ealand, John Robert....Aisthorpe House, Lincoln
Eardley, Wm....Larkton Hall, Malpas
†Earle, Frederic W.....Edenhurst, Prescot, Lanc.
†Eastenson, Thomas...Bawdsey, Woodbridge
Easton, George....Horsley Hill, South Shields
†Easton, James...Nest House, Gateshead
Easton, James...Grove, Southwark, S.E.
Easton, William....6, Hammet Street, Taunton
Easton, William...Bradford, Taunton
Eastwood, R...Thorney Holme,Whitewell, Clitheroe
Eaton, Charles O....Tolethorpe Hall, Stamford
†Eaton, George...Spixworth, Norwich
Eccles, H. J....Spriddlestone, Brixton, Plymouth
Eckersley, James...Burnt House, Chorley
Eckley, Richard...12, Darlington Place, Bath
†Eddison, Francis...North Laiths, Ollerton, Newark
†Eddison, R. W....Headingley Hill, Leeds
†Eddison, William...Huddersfield
†Eddowes, Thos. Henry....Pontesbury, Salop
†Eden, Hon. Wm. Geo....Doncaster
†Eden, J....Beamish Pk., Chester-le-Street, Durham
Eden, Peter...Cross Lane, Salford
Edge, Davis...Outhill, Studley, Warwickshire
†Edge, James Thomas...Strelley Hall, Nottingham
†Edmonds, F. E....
Edmonds, Wm. J....Southrope House, Lechlade
Edmondson, John...Grassyard Hall, Lancaster
Edmunds, Edmund...Rugby
Edwards, Chas. G....George Street, Plymouth
Edwards, Francis...Pickeridge House, Slough
Edwards, Frederick...Barnham, Thetford
Edwards, G. Withers, jun....Woolston, Oswestry
Edwards, Henry N....Broadwood, Leominster
Edwards, James L....Rochester, Kent
Edwards, John James....Broad Heath, Presteign
Edwards, Joseph...Hutton, Weston-super-Mare
Edwards, Joseph Priestley.. Fixby Park, Halifax
†Edwards, Thomas....Wintercott, Leominster
Edwards, T. F...Tanholt Farm, Eye, Peterborough
Effingham, Earl of...Tusmore House, Bicester, Oxon
Egerton, Sir P. de M. G., Bt. M.P....Tarporley
Egerton, Lord...Tatton Park, Knutsford
Eggar, James...Bentley, Farnham
Eggleston, Edward J....Great Peatling, Lutterworth
Eggleston, Wm....Wigston Magna, Leicester
Ekin, Thomas...Newmarket
Elcho, Lord, M.P....Armisfield, Haddington, N. B.
Eley, W.H., jun...Islingham, Frindsbury, Rochester
†Elkins, J. N...Elkington, Welford, Northamptonsh.
†Elliot, John...Chapel Brampton, Northampton
†Elliot, J. Lettsom...10, Connaught Pl., HydePk., W.
Elliott, George...Swilley Farm, Plymouth
Elliott, Samuel...Trafalgar House, Plymouth
Ellis, Alfred...Belgrave, Leicester
Ellis, Charles...Court House, Beddingham, Lewes
Ellis, Charles...Meldreth, Royston, Cambridge
Ellis, James...Greenfield, Leicester
†Ellis, John...Artington, Guildford
†Ellis, Robert Ridge...Yalding, Kent
Ellison, Charles...Oldbury Lodge, Bridgnorth
Ellman, R. H....Landport, Lewes
Elmhirst, Rev. E....Shawell Rectory, Rugby
Elston, William...Bank House, Selby
†Elston, Capt. W....St. Ann's Rd., North Brixton, S.
Elton, Sir E. M., Bt....Widworthy Court, Honiton
Elvidge, Benjamin...Leven, Beverley
Elwes, John H....Closeburn House, Cheltenham
Emberlin, Horatio E....Oadby, Leicester
Embleton, Robert...Backworth, Newcastle-on-Tyne
Emery, E. Crosswiller...Storrington, Sussex
Emery, Richard A....Lostford, Market Drayton
Emery, R. Coleman..Hurston Place, Storrington
Emson, H. H....Nether Hall, Cherry Hinton, Camb.

England, Richard...Binham, Wells, Norfolk
Enniskillen, Earl of....Florence Court, Enniskillen
†Entwistle, John S....Foxholes, Rochdale
Enys, John Samuel...Enys, Penryn, Cornwall
Epton, W. M....Langton, Wragby, Lincolnshire
Erichsen, H. G...Fairfield, Newcastle-on-Tyne
†Erkoig, Adolphus...Derekegyhaza, Pesth, Hungary
†Erle, Rev. Christopher...Hardwicke, Aylesbury
Erle, Rt. Hon. Sir W., Kt...Bramshot Grange, Liphook
Ernest, Henry...17, Salisbury Street, Strand
†Errington, Rowland...Sandon, Hexham
Esam, Wm....Averham Park, Newark
Esdaile, W. C. D....Burley Park, Ringwood, Hants
Ethelston, Rev. C. W....Up Lyme, Lyme Regis
Ettrick, Anthony....North Hylton, Sunderland
†Evans, E. Bickerton...Whitbourne Hall, Worcester
Evans, E. M....Llwynbarried, Nantmel, Rhayader
Evans, Edward...7, Morton Street, Sunderland
Evans, George...Wimborne, Dorset
†Evans, Henry J....Bank, Cardiff
Evans, H. Rawlings, jun....Swanstone, Leominster
Evans, Isaac Pearson...Griffe, Nuneaton
Evans, James Eaton...Haverfordwest
Evans, John...Uffington, Salop
Evans, Robert....Tolladine, Worcester
Evans, R. P....4, Gray's Inn Square, W.C.
†Evans, R. W....Eyton Hall, Leominster
Evans, Samuel...Darly Abbey, Derby
Evans, Thomas....Astwood, Worcester
Evans, Capt. T. B....Uddens, Wimborne, Dorset
Evans, Thos. M...Bathford Lodge, Haverstock Hill
†Evans, Rev. W. E....Burton Court, Herefordshire
†Evans, W. Herbert...Ford Abbey, Chard
Everard, W...Narboro' Wood House, Leicester
Everett, Rev. C. H.....Tangley, Andover
Everett, F. H....Bridgeham, Thetford
Everington, Wm, jun.....Skegness, Burgh-le-marsh
†Everington, W. D....Dillington Ho., E. Dereham
Everitt, James...Eaton, Norwich
Evershed, Henry...Shere, Guildford
Evershed, John....Albury, Guildford
Everson, Edgar James...Harleston
Ewen, Thomas L'Estrange...Dedham, Colchester
Ewings, Wm...Lond. & Westm. Bank, Lothbury, E.C.
†Exeter, Marquess of...Burghley House, Stamford
Exley, Wm. H....Wisbeach
Eyke, John...Stanton, Shiffnal
†Eyre, Edwin...The Cottage, Bishop's Stortford
†Eyre, G. E....Warrens, Stoney Cross, Southampton
Eyre, Henry R....Shaw House, Newbury
Eyre, R. T....Bartley, Totton, Southampton
†Eyres, Capt. Harry...Knockwood Park, Tenterden
Eyton, John Wynne...Lee's Wood, Mold
†Eyton, Thos. C....Vineyard, Wellington, Salop

F.

Faber, C. Wilson...Northaw House, Barnet, N.
Fair, J....Warton Lodge, Lytham, Preston, Lanc.
Fair, J....Tabley Villa Farm, Knutsford
†Fair, William....Aston-by-Budworth, Northwich
Falla, W. C......Crammer Dyke House, Gateshead
Falmouth, Viscount...Mereworth Castle, Maidstone
†Fardon, H. F....The Firs, Bromsgrove
Fardon, J. A....Witton House, Droitwich
†Farhall, J. N....Tillington, Petworth
Farmer, Edward...Comberford Hall, Tamworth
Farmer, James....Lawton, Pembridge
Farnham, E. B.....Quorndon House, Loughborough
Farnworth, J. K....Alderley Edge, Manchester
†Farr, Richard...Hereford
†Farr, Wm. Wyndham...Iford, Christchurch, Hants
†Farrell, Edward W....Dublin
†Farrer, Edmund...Sporle, Swaffham
Farrer, James...Ingleborough, Lancaster
†Farrer, O. W....1, Hamilton Place, Piccadilly, W.
Farthing, Walter...Stowey Court, Bridgwater
Faulkner, C. F. A....Bury Barnes, Burford, Oxon
Faulkner, John...Bretby Farm, Burton-on-Trent
Faviele, George...Amcotts Lodge, Doncaster
†Faviell, Mark, jun....
Faviell, William Fred....Down Place, Guildford
Fawcett, E. A....Childwick Hall, St. Albans
Fawcett, John...Durham
Fawcus, John....South Charlton, Chathill
Fawcus, Henry William....Elford, Chathill
Fawkes, F. H....Farnley Hall, Otley
Featherstone, Wm....Sunley Hall, Kirby-Moorside
Featherstonhaugh, R....Rockview, Killucan
Feilden, Captain H. M....Witton Park, Blackburn
Feilden, Joseph...Witton Park, Blackburn
†Feilden Robert...Coxbench, Derby
Felgate, W....44, Gloucester Cres., Hyde Park, W.
†Fellowes, Jas....29, Gloucester Place, W.
Fellowes, Robert....Shotesham Park, Norwich
Fellowes, Rev. T. L....Vicarage, Honingham
†Felton, Clement...Dunton, Fakenham
†Fenn, Thomas...Stonebrook House, Ludlow
†Fenton, Joseph....Bamford Hall, Rochdale
†Fenton, William....Beaumonds, Rochdale
Fenwick, George A....The Bank, Newc.-on-Tyne
Fenwick, J. C.....Newcastle-on-Tyne
†Ferard, Charles Colton...Ascot Place, Windsor
Ferguson, A....Government Farm, Dartmoor
†Ferris, T....Manningford Bohune, Pewsey, Wilts
†Ferris, William...Draycot, Marlborough
Festing, R. G...1, Queen Sq. Place, Westminster
Feversham, Earl of...Duncombe Park, Helmsley
Field, George...Ashurst Park, Kent
†Field, Henry...East Lodge, Tulse Hill, S.W.
Field, James Pope...
Field, Samuel...Farnsfield, Southwell
†Field, William...224, Oxford Street, W.
Field, William David...Swan Hill, Shrewsbury
†Fielden, Joshua...Stansfield Hall, Todmorden
†Fielden, S....Centre Vale, Todmorden
†Fieldsend, C. R., jun....Kirmond, Market Rasen
†Filgate, L. G. P....Lisvenney, Ardee, Ireland
†Filmer, Sir E., Bart...East Sutton, Staplehurst
Finch, J....1, Adelaide Place, London Bridge, E.C.
†Finch, Rev. W....Warboys, Huntingdonshire
†Findlay, John...
Findlay, T. Dunlop...Easter Hill, Glasgow

Finlay, Alex. S....Castle Toward, Greenock
Finney, Samuel....Gateshead
†Finnis, Steriker...The Elms, Hougham, Dover
Firkins, Geo. John....Bishampton, Pershore
†Fisher, Capt. C....Prospect House, Whitehaven
†Fison, A. J....Barningham Hall, Ixworth
Fison, Cornell....Thetford
†Fison, Cornell Henry...Thetford
†Fison, J. P....Manor House, Feversham, Cambs.
Fison, Joseph...Ipswich
†Fitzgerald, Maj. H. T.G...MapertonHo., Wincanton
Fitzherbert, Sir W., Bt...Somersal Herbert, Uttoxeter
†Fitzhugh, Thomas Lloyd...Plas Power, Wrexham
Fitzhugh, Rev. Wm....Street, Lewes
Fitzpatrick, Rt. Hon. J.W., M.P..Abbeyleix, Ireland
Fitzroy, George...Grafton-Regis, Stony Stratford
Fitzroy, Lt.-Col. H....Stratton Strawless, Norwich
†Fitzwilliam, Hon. C.W., M.P..Alwalton, Peterboro'
Fitzwilliams, E. C. L....Adpar, Newcastle Emlyn
†Fitzwygram, Lt.-Col. Fred....Carlton Club, S.W.
†Fletcher, Lt.-Col. E. C....Kenward, Yalding
Fletcher, George...Shipton Sollars, Cheltenham
Fletcher, George...The Friars, Leicester
Fletcher, J....Holford Villa, Lostock, Knutsford
Fletcher, John....Merton Hall Farm, Merton, S.
Fletcher, John Charles...Dale Park, Arundel
†Fletcher, J. P....Sunbury, S.W.
†Fletcher, Capt. Joseph...Lowther St., Whitehaven
Fletcher, Robert...Hanover Square, Newc.-on-Tyne
Fletcher, Thomas...Deeping St. Nicholas, Spalding
†Fletcher, W. H....Shipton Olliffe, Cheltenham
Flewett, T. S....Holmer Villa, Hereford
Flower, Charles Henry...France Farm, Blandford
Floyer, John...Hints, Tamworth
†Floyer, John, M.P....Stafford, Dorchester
†Foljambe, Geo. Saville...Osberton House, Worksop
Folkstone, Viscount...Longford Castle, Salisbury
Fookes, H....Whitechurch Farm, Blandford
Forbes, John M....Dropmore, Maidenhead
Ford, Rev. C. H....Bishopton, Stockton-on-Tees
†Ford, George....Barlaston, Stone, Staffordshire
Ford, James...11, Frankfort Street, Plymouth
Ford, J., jun....Rushton Farm, Blandford
Ford, John....Moreton Hall, Warwick
Ford, John....Tancred, Whixley, York
Fordham, Edward...Odsey House, Royston
Fordham, Edward King...Ashwell, Baldock
Fordham, John George...The Priory, Royston
Foreman, George..Benton Grange, Newc.-on-Tyne
Forester, G. T....Ercall Magna, Wellington, Salop
†Forrester, Jos. James...
Forster, Abraham T....Garrettstown, Kinsale
†Forster Charles...Hanch Hall, Lichfield
Forster, George....Washington, Durham
Forster, R. C....White House, Gateshead
†Forster, Samuel...Southend, Sydenham, S.E.
Fortescue, Hon. G....Boconnock, Lostwithiel, Cornw.
†Foster, H. W....Cranwell Lodge, Sleaford
Foster, J....Ledsham, South Milford
Foster, John...Copson Lodge, Hinckley
Foster, J. P...Killhow, Wigton, Cumberland
†Foster, John James...Mansion Street, Lincoln
†Foster, Richard...Castle, Lostwithiel, Cornwall
Foster, T. Nelson....Gloucester
Foster, Wm....Canwick House, Lincoln
†Foster, William...Stourton Court, Stourbridge
†Foster, W. O., M.P....Stourton Castle, Stourbridge
Fothergill, James...Beeston, Nottingham
Fothergill, R....Hensol Castle, Cowbridge, S.Wales
Fothergill, W...Cefnrhychdir, Tredegar, Monmouth
†Fountaine, Bernard T....Stoke House, Bletchley
Fowke, Sir F.T., Bart...Lowesley Hall, Leicester
Fowle, W....Market Lavington, Wiltshire
Fowler, Francis...Henlow, Biggleswade
Fowler, John K., jun....Aylesbury
Fowler, L. P...Little Bushey Farm, Bushey
Fowler, R., jun....14, Bennett's Hill, Birmingham
Fowler, Robert...Leeds
†Fowler, Robert C....Gunton Hall, Lowestoft
†Fox, Chas. B....Malpas, Newport, Monmouthshire
Fox, Frederick F....Melbourne, Derby
†Fox, G. Lane...Bramham Park, Tadcaster
Fox, Robert...Falconhurst, Edenbridge
Fox, William...Dunston, Sleaford
†Fox, William...Adbury, Newbury
Foxton, George...Prebend Terrace, Leicester
Frampton, Henry...Okers Wood, Dorchester
Francis, Clement...Quy Hall, Cambridgeshire
Francis, Frederick...Warley Place, Brentwood
†Frank, F. Bacon...Campsall Hall, Doncaster
Frank, John Charles...Rhayadir, Oswestry
Franklin, Edward L....Ascott, Wallingford
†Franklin, Richard...Clemenstone, Bridgend
Franklin, Robert...The Park, Thaxted
Franks, George...Thong, Gravesend
Franks, James...Bramley, Guildford
Franks, Thomas...21, Lower Fitzwilliam St., Dublin
Frederick, Sir R., Bt...Burwood Park, Esher
†Freebody, Wm. Y...239, Hackney Road, N.E.
Freeman, Edwin...Chilton, Thame
Freeman, John G....Aspall House, Debenham
Freeman, P...High Heaton, Newcastle-on-Tyne
Freeman, Thomas...Henham, Wangford
Freeman, Thomas..Benton Pl., Newcastle-on-Tyne
Freeman, W. P. W....
Freer, Chas. T....The Coplow, Billesden, Leicester
Freer, F. Hubert...Hampton, Evesham
French, Richard Day...St. John's, Bungay
†Frere, G. E....
Fretwell, C. H....Arrandale, Laurie Pk., Sydenham
Frewer, Alfred...Debenham, Ipswich
†Fries, Count August...Moravia, Praitz Station
†Frost, Chas....Wherstead, Ipswich
Frost, Edward...West Wratting Hall, Linton
†Fry, James Thomas...Boston, Bromley, S.E.
Fry, Thomas...Baglake Farm, Dorchester, Dorset
†Fryer, H. C....Lodge Park, Taliesin, Shrewsbury
Fryer, W. Fleming...The Wergs, Wolverhampton
Fuggle, T. G.....Crown Hotel, Worcester
Fulcher, Thomas...Elmham Hall, Thetford
Fuller, F. G....Reading
Fuller, Robert Willes...Croydon, S.
Fulljames, Thos....Foscombe, Gloucester
Fulshawe, R...Nether Hall, Queniborough, Leicester
Furneis, John...Coxhoe, Ferryhill, Durham
Furness, Rev. J. M....Oakfield House, Rugby

Fussell, Rev. James G. C....The Chantry, Frome
Fussell, Rev. J. T. R....Amroth Castle, Tenby
Fyers, Col. W. A., C.B....United Service Club S.W.
Fyson, Edward...Higham, Bury St. Edmund's
†Fytche, J. Lewis...Thorpe Hall, Elkington, Louth

G.

Gadesden, Augustus W....Ewell Castle, Surrey
†Gainer, Charles, M.A....3, Merton Street, Oxford
Gale, Chas. J....Kilnocks, Botley, Hants
Galpin, George...Tarrant Keynston, Blandford
Galpin, John...Dorchester
Galpin, Thomas P....Little Langford, Heytesbury
†Galton, Darwin...Claverdon Leys, Warwick
†Galway, Viscount, M.P....Serlby Hall, Bawtry
†Gamble, D....Gerard's Bridge, St. Helen's, Lanc.
Gamble, H. Thomas...28, Lincoln St., Leicester
Gambles, Herbert E....Nocton, Lincoln
†Gamlen, Wm. H....Brampford Speke, Exeter
†Gammie, Geo....Shotover House, Wheatley, Oxon
Gandy, Rev. J. H....Stanwick, Higham Ferrers
Gandy, Lt.-Col....Heaves, Milnthorpe
Garbutt, Thomas...Yarm, Cleveland
Garbutt, William...Dunston Lodge, Gateshead
†Gard, R. Sommers...Rougemont House, Exeter
Garde, T....Ballinacurra, Middleton, co. Cork
Gardner, John...Twycross, Atherstone
Gardner, R. W....Parsonage, Ombersley, Droitwich
Gardner, William...Bekesbourne, Canterbury
Gardner, W. A....Hough Green, Chester
†Gardom, T. W....The Yild, Baslow, Chesterfield
Garlt, Charles...Queenstown, co. Cork
Garne, George...Churchill Heath, Chipping Norton
†Garne, John...Filkens, Lechlade
†Garne, Robert...Aldsworth, Northleach
†Garne, Wm....Manor House, Cerney, Cirencester
Garnett, Jeremiah....Wharfeside, Otley, York
Garnett, William...Bashall Lodge, Clitheroe
Garnett, W. J....Quernmore Park, Lancaster
Garrard, E. H....Beacon Street, Lichfield
Garrard, C. B. D....Lamar Hall, St. Albans
†Garratt, John...Bishop's Court, Exeter
Garrold, R. H...Kilforge, Ross
Garsed, John...The Moorlands, Cowbridge
Garth, T. C....Haines Hill, Reading
Gascoyne, Wm....Bapchild Court, Sittingbourne
Gascoyne, William Whitehead...Sittingbourne
†Gaskell, Henry L....Kiddington Hall, Woodstock
†Gatacre, Edward L....Coton, Kidderminster
Gater, John...West End, Southampton
Gates, John A....Grange Farm, Sapiston, Ixworth
†Gates, R....7, Sussex Place, Horsham
Gaudern, J....Earl's Barton, Wellingborough
Gaudin, Philip...Spring Farm, St. Heliers, Jersey
Gaunt, Thomas....Smite, Worcester
Gauntlett, F. E...Leazes Terrace, Newcastle-on-Tyne
Gauntlett, W. H...Furness Abbey Hotel, Furness
†Gauthorp, Henry...Widness, Warrington
†Gawne, Edw. Moore...Keatraugh, Isle of Man

Gayford, G....The Lodge, Barrow, Bury St. Edmd's
Gayford, George...Rymer House, Thetford
†Geary, Sir W. R. P., Bt....Oxen Heath, Tunbridge
Gedge, Charles J....Bury St. Edmund's
†Gee, John...Welford, Rugby
Gee, Thomas...Brothertoft, Boston
Gee, Thomas...Dewhurst Lodge, Wadhurst, Sussex
Geldard, Christopher John...Cappleside, Settle
†George, R....Waterston Ho., Puddleton, Dorch.
George, Thomas.. Bythorne, Thrapstone
George, T. Willington...Bellevue House, Leeds
†German, George...Measham Lodge, Atherstone
†German, William...Measham Lodge, Atherstone
Gerrard, John...Adlington, Chorley
Gervis, Sir G. E. M. T., Bt....Christchurch, Hants
Gibbens, Edward...Minster, Isle of Thanet
Gibbon, A...Staunton, Coleford, Gloucestershire
Gibbons, Henry...Hampton Bishop, Hereford
Gibbs, Charles E....Icklingham Hall, Mildenhall
†Gibbs, George...Belmont, Bristol
†Gibbs, Hen. H...St. Dunstan's, Regent's Pk., N.W.
Gibbs, Philip H....Eckington, Worcester
Gibbs, Robert...Carhampton, Dunster
Gibbs, Thomas...Sawndby, Gainsborough
Gibbs, Thomas...26, Down Street, Piccadilly, W.
Gibbs, W....Alveston Hill, Stratford-on-Avon
Gibbs, Wm....Tyntesfield, Bourton, Bristol
†Gibson, John Kirk..Ingleby, Lincoln
Gibson, Robt... South Benwell, Newcastle-on-Tyne
Gibsone, Capt. J....Rotherby, Leicestershire
Gilbert, Henry...Barnby Manor, Newark, Notts
Gilbert, John...Perry Barr, Birmingham
†Gilbert, R....Ashby Hall, Berghapton, Norfolk
†Gilbert, R., jun....Rockland St. Mary, Norwich
Gilbert, T. Norman...High Street, Leicester
†Gilbert, Thomas W....The Close, Salisbury
†Gilbert, William A....Cantley, Acle
Gilbertson, M....Elm Cottage, Egham Hill, Surrey
Giles, Henry, jun....Croxton Park, Thetford
†Gilford, William...North Luffenham, Uppingham
Gill, George...Weston, Shrewsbury
Gillett, Charles...Cote House, Bampton, Oxon
Gillett, John...Oaklands, Charlbury
Gillett, John...Minster Lovel, Witney
Gillett, Thomas...Kilkenny, Faringdon
Gilliat, W. J..Ashby Puerorum, Horncastle
Gillow, Rev. Charles...Ushaw College, Durham
Gillow, Richard, jun....Leighton Hall, Lancaster
Gilpin-Brown, G...Sodbury Park, Richmond, Yorks.
Gilstrap, William..Fornham Pk., Bury St. Edmund's
Ginders, Samuel...Ingestre, Stafford
Gittus, Robert...West Row, Soham
Glaisier, William Richard...41, Charing Cross, S.W.
Glanville, R. Carew...Tregothnan Office, Truro
Glegg, Lt.-Col. E. Holt...Backford Hall, Chester
Glen, G....Stratton Audley Park, Bicester
†Glendining, Alexander...Red Leaf, Penshurst
Glenton, Frederick...Benham, Newcastle-on-Tyne
Glover, John...Bangley, Tamworth
Glover, Robert...Wexford, Lichfield
Glynne, Rev. Henry...Hawarden Rectory, Chester
Glynne, Sir S., Bt...Hawarden Castle, Flints.
†Gobbitt, John...The Grove, Hollesley, Woodbridge

Godard, R. H.... Tibberton, Droitwich
Goddard, H. N... Manor Ho., Cliffe, Wootton-Bassett
Goddard, Joseph... Stoneygate, Leicester
Goddard, Thomas... St. Fagans, Cardiff
†Goddard, Wm. R.... Glaston Hill Ho., Eversley, Hants
Goddard, Wm. Gilbert... Broad Chalk, Salisbury
Godfrey, Wm.... Borough Fields, Burton-on-Trent
†Godsal, Philip Wm... Iscoyd Pk., Whitchurch, Salop
Godwin, Robert... Water Eaton, Cricklade
Godwin, William... Lugwardine, Hereford
Goff, William... Carriglea, Kingstown, Ireland
Goggs, James... Great Baddow Park, Chelmsford
Golding, T. M.... Walsham-le-Willows, Ixworth
Goldingham, H. G...
Goldsmith, George... Sapiston, Ixworth
Goldsmith, Harry... Corn Hill, Bury St. Edmund's
Goldsmith, Thomas... Dairy Farm, Ixworth
†Golledge, Matthias... Forthampton, Tewkesbury
†Gonne, Charles... 20, St. Helen's Place, E.C.
†Gooch, John Virel... Reform Club, Pall Mall, S.W.
Goodacre, Rob. J... 22, Lower Hastings St., Leicester
Goodchild, Philip.. The Grange, Glen Parva, Leicester
Goodchild, Robert.. Garboldisham, East Harling
†Goodden, John... Over Compton, Sherborne, Dorset
†Goodhart, Charles E.... Langley, Beckenham
†Goodlake, F. Mills... Wadley Ho., Faringdon
Goodson, Wm.... Hill Farm, Mitcham, S.
Goodwin, E. J.... Canon Court, Wateringbury, Kent
Goodwin, Frederick... Town Mills, Droitwich
Goodwin, G.... Pershore, Worcestershire
Goodwin, J.... Bath and West of England Soc., Bath
Gordon, Charles... Wiscombe Park, Honiton
†Gorringe, Hugh.. Southwick Green, Shoreham
Gosford, Vincent... Tan-y-llan, Holywell, Flintshire
Gosling, Robt... Hassobury, Bishop's Stortford, Herts
Gosling, Thomas G.... 15, Portland Place, W.
†Gosset, Major Arthur... West Park, Mortlake, S.W.
†Gotch, Wm. Hepburn.. Chilcombe Farm, Winchester
Gothorp, James... Mowbray Hill, Bedale
Goucher, John... Woodsetts, Worksop
Gough, Ashwin D... Hinton, Evesham
Gould, John... Hyde Hall, Denton, Manchester
Gould, Joseph... Newhall, Broadclist, Devon
Gouldbourne, Joseph... Wilkesley, Whitchurch
Goulding, Wm.... 108, Patrick Street, Cork
Goulter, Allen... Hawkesbury, Chipping Sodbury
Gouthwaite, Richard... Lumby, South Milford
†Gow, James... Fowler's Park, Hawkhurst, Kent
Gower, Andrew... Market Drayton
†Gower, Erasmus.. Clyn Derwen, Narberth, S. Wales
†Gower, J. Leveson... Westwood, Colchester
†Gower, Robt. F... Clyn Derwen, Narberth, S. Wales
†Gower, G. W. G. Leveson... Titsey Pk., Godstone
†Grafton, Duke of... Easton, Thetford
Graham, Alexander... Brimstage, Birkenhead
†Graham, James... Belle Vue Cottage, Kew, S.W.
Graham, J. W. H.... Wortham Hall, Diss
Graham, Walter... West Drayton
Graham, William, jun.... Pewet, Abingdon
Graham, William, jun.... Newport, Monmouth
Grain, Peter... Shelford, Cambridge
†Grant, Sir G. McPherson, Bt.. Ballindalloch Cas., N.B.
Grant, John... Love Lane, Bankside, S.E.
Grant, William... Litchborough, Weedon
†Grantham, George... Barcombe Place, Lewes
Grantham, Major, H. V.... West Keal Hall, Spilsby
Grantham, Henry.. Scawby, Brigg
Grantham, R. B., C.E.,... 22, Whitehall Place, S.W.
Grantley, Lord... Wonersh Park, Guildford
†Granville, Earl, K.G.... Aldenham, Bridgnorth
Graves, A. E... Rosbercon Castle, New Ross, Wexford
Graves, Robert... Charlton, Shaftesbury
Gray, Edward... Moscow Works, Sheffield
†Gray, Frederick...
†Gray, G. W.... Gatton, Reigate
Gray, John C... King's Grange, Castle Douglas, N.B.
†Gray, Jonathan... Summerhill, Bath
Gray, Thos.... Clayton St. West, Newcastle-on-Tyne
Grazebrook, George... The Race Course, Stourbridge
Greaves, William... Bakewell, Derbyshire
Green, Alfred... Kinwarton, Redditch
Green, John... Newtown Farm, Worcester
Green Joseph B.... Marlow, Leintwardine
Green, Robert... Scalby, Scarborough
Green, Stephen... Haverfordwest
Green, Rev. Thomas... Vicar of Badby, Daventry
Green, William... Rutland Street, Leicester
†Greenall, G., M.P.... Walton Hall, Warrington, Lanc.
Greene, Edward, M.P... Westgate, Bury St. Edmd's.
Greene, E. W... West Gate St., Bury St. Edmund's
†Greene, Harry A.... Crown Street, St. Ives, Hunts.
Greene, John... Millbrook, Magany, Kildare
Greene, John... Rodsley House, Gateshead
Greene, John M.... Stradeshall, Newmarket
†Greene, Thomas... Whittington Hall, Lancaster
Greene, Wm.... Ditcham Park, Petersfield
Greening, E. O.... Broughton, Manchester
Greenly, C. W.... Titley Court, Titley, Herefordshire
†Greenwell, Thomas... Broomshields, Darlington
†Greenwood, J.... Swarcliffe Hall, Ripley, Yorkshire
Greetham, William... Stainfield Hall, Wragby
†Gregg, Thomas...
Gregory, George... Crowhurst, Battle
Gregory, J. S.... Harlaxton Manor, Grantham
†Gregson, Matthew... Toxteth Park, Liverpool
†Greig, D.... Fowler's Steam Plough Works, Leeds
Grenfell, Arthur Riversdale... Travellers' Club, S.W.
†Grenville, R. N., M.P.... Butleigh Ct., Glastonbury
Gresley, Sir T., Bt... Cauldwell Hall, Burton-on-Trent
Greville, Col. F. S., M.P.. North Mimms Park, Hatfield
†Grey, Charles G... Dilston, Corbridge-on-Tyne
†Grey, Hon. Brow. N. Osborn De... Watton, Norfolk
†Grey, Hon. G. De... 11, South Audley Street, W.
†Grey, Hon. Sir F. W., G.C.B.... Lynwood, Staines
†Grey, Hon. & Rev. F. De... Copdock Recty., Ipswich
Grey, Jas.... Kimmerston, Wooler, Northumberland
†Grey, Rt. Hon. Sir G., Bt., M.P... Fallowden, Alnwick
Griffin, Alfred E.... Wolverhampton
Griffin, Clement W.... Werrington, Peterborough
Griffin, Edward... Towersey Manor, Thame
Griffin, James B.... Bury St. Edmund's
Griffin, John... Borough Fen, Market Deeping
Griffith, C. Darby, M.P.... Padworth House, Reading
Griffith, E. H.... Plas-Newydd, Trefnant, Rhyl
Griffith, J... Llwynduris, Newcastle-Emlyn
Griffith, John, jun.... Trevorgan, Cardigan

Griffithes, Thomas J....Bishop's Castle, Salop
Griffiths, Edward...New Court, Hereford
Griffiths, John H....The Weir, Hereford
Griffiths, Samuel...Overton, Flints
Griggs, George...Oaklands, Romford
†Grimes, Wm. Howlett..Bubbenhall, Kenilworth
Grimston, Capt. R. V. S....Leicester
Grimston, Lt.-Col. Oswald A...Yeatton, Leamington
Grimwade, Edward...Ipswich
†Grisewood, H....Daylesford Ho., Chipping Norton
†Grissell, Thos...Norbury Park, Dorking
Grosvenor, Earl, M.P....28, Princes Gate, S.W.
Grout, John...Bull Hotel, Woodbridge
Grundy, E. S....Reddish Hall, Warrington
Gruning, Louis...Broomborough, Chester
Gubbins, Joseph...Kilfrush, Knocklong, Limerick
Gulliver, William...Swalcliffe, Banbury
Gulston, Alan J..Dirleton, Llangadock, Carmarthens.
Gunnell, Thomas...Milton, Cambridge
Gunner, William...Will Hall, Alton
†Gunter, Captain Robert...Wetherby
†Gurdon, B....Letton Hall, Shipdham, Norfolk.
†Gurdon, Rev. P..Cramworth Rcty.,Shipdham,Norfk.
†Gurdon-Rebow, J.,M.P...Wivenhoe Pk.,Colchester
†Gurdon, William...Brantham, Manningtree
†Gurney, John Henry...Marldon, Totnes
†Gurney, Rt. Hon. Russell, M.P..8, Palace Grdns,W.
Gurney, Samuel, M.P...Carshalton, S.
†Guthrie, John...Guthrie Castle, Forfarshire
Guy, G. F....Angel Hotel, Bury St. Edmund's
Guy, W. G....Angel Hotel, Bury St. Edmund's
Gwilt, Rev. R....Icklingham, Mildenhall
Gwyn, H....Dyffryn, Neath, Glamorganshire
Gwyn, Wm. Edw....Plas Cwrt Hyrs, Carmarthen

H.

Hack, Matthew...Leicester
Hacker, John Heathcote...Leek, Staffordshire
Hadden, A....The Old Parks, Ashby-de-la-Zouch
Haddock, Henry...
Hagen, Jacob...Ropley House, Alresford
Haggard, Wm. M. R...Bradenham Hall, Thetford
Haig, George Augustus,..7, Argyle St.,Regent St.W.
†Haig, J. H....
Haine, George...Over Farm, Gloucester
Haines, J. Pool...Duntisbourne House, Cirencester
Hale, Chas. C....Glenlochay, Killrie, Perthshire
Hales, C...Manor House, Bassingbourne, Royston
Hales, Edward...Oil Mills, Dover
Halford, T....Glenfen, Newtown, Montgomerysh.
Halford, T....Newbold-on-Stour, Shipston-on-Stour
†Halifax, Viscount..Hickleton Hall, Doncaster
Hall, Alexander Hall...Watergate, Emsworth
Hall, Benjamin...Wood Farm, Malvern Wells
Hall, Charles...Brickwood Villa, Croydon, S.
Hall, Collinson...Navestock, Romford, E.
Hall, Francis...Park Hall, Mansfield
Hall, George...Garford, Yarkhill, Ledbury
Hall, George S....Ely, Cambs
†Hall, Henry...
Hall, James...Scarborough Hall, Beverley]
†Hall, John...Hesley Hall, Tickhill, Rotherham
Hall, J. O....1, Brunswick Row, Queen's Sq., W.C.
Hall, Major-Gen....Carlton Club, Pall Mall, S.W.
†Hall, Marshall...44, Chancery Lane, W.C.
Hall, Richard...Baglan House, Neath, S. Wales
†Hall, William...Ashton, Leominster
Hall, Wm...Seven Springs, Cubberley, Cheltenham
Hallam, John...Newcastle, Staffordshire
Hallam, Thos....Bridlesmith Gate, Nottingham
†Hall Dare, F.M....
Hall Dare, R. W....Newtownbarry-house, Ireland
Hallett, Fred. Fran....The Manor House, Brighton
†Halliday, J....Chapel Cleeve, Taunton
Halls, Frederick C....Denham, Bury St. Edmund's
Halls, Joseph..Denham Castle, Bury St. Edmund's
Halse, Philip...Molland, South Molton
Halsey, Thomas...Whitminster, Stonehouse, Glos.
Hambleton, A. P....Harley Thorn, Newcastle, Staf.
Hambly, Abraham,...Bodmin
Hambly G. Edm....Blabell, St. Issey, Wadebridge
†Hambro, Charles...Milton Abbey, Blandford
†Hambrough, Albert J....Steep Hill Castle, Ventnor
Hamer, Charles M...Snitterfield, Stratford-on-Avon
Hamel, Alfred J....Lancaster Place, Leicester
†Hames, John...Rotherby, Leicester
†Hamilton, Capt. Archibald...Rozelle, Ayr
Hamilton, Chas.W.....Hamwood, Clonee, Co. Meath
†Hamilton, John...Sundrum, Ayr, N. B.
†Hamilton, John...Hilston Park, Monmouth
†Hamilton, Sir R. N. C., Bt.,K.C.B...Strat. on Avon
†Hamilton, Wm. M....2, Orchard Place, Canterbury
Hammersley, Hugh...Great Haseley, Tetsworth
†Hammersley, Wm...Parkinson Street, Nottingham
Hammond, Dr...11, Charlotte St., Bedford Sq., W.C.
Hammond, Edw....Gesyns, Newmarket
Hamond, Charles Frederick...Newcastle-on-Tyne
Hamond, Philip...Ashurst Lodge, East Grinstead
†Hamond, W. Parker...Pampisford Hall, Cambridge
Hampton, George...Findon Park Farm, Worthing
Hanbury, B. B....Fordham Abbey, Downham, Norf.
†Hanbury, E....Eastrop Grange, Highworth
Hanbury, Osgood, Jun....Howe Hatch, Brentwood
Hanbury, Robert...Poles, Ware
Hancock, J. Donne...Halse, Taunton
Hand, James...Ludlow
†Handley, Maj. B...Pointon Ho., Folkingham, Linc.
Handy, Edward...Sierford, Cheltenham
Hanmer, Sir J.,Bt., M.P...Bettisfield Pk.,Whitchurch
Hannam, Henry J....Burcote, Abingdon
†Hannay, Robt....Springfield, Ulverston
Hanning, James...Stubbing's House, Maidenhead
Hansell, Septimus...Martin House, North Shields
Harbin, George...Newton House, Yeovil
Harcourt, Edw. W....Stanton Harcourt, Witney
Harcourt, Colonel Francis V...5, Carlton Gns., S.W.
†Hardacre, Richard...Hellifield, Leeds
Harding, Egerton W....Old Springs, Market Drayton
Harding, Charles...Knighton, Leicester
Harding, George...Newbury, Berks
†Harding, John...Dursley, Gloucestershire
Harding, James...Waterson, Dorchester
Harding, S. T....Stinsford Farm, Dorchester
Harding, Wm. C....Thame, Oxon

Hardinge, Edm. S.... Stonewall Park, Edenbridge
Hardon, Edwin... Heaton Norris, Stockport
Hardstaffe, Dodson... West Leake, Loughboro'
Hardwick, Alfred... Hangleton, Portslade
Hardwick, R.... Bowden, Altrincham, Cheshire
Hardy, James... Jaques Hall, Manningtree
Hardy, Jeffery... Plymouth
†Hardy, John, M.P.. Dunstall Hall, Burton-on-Trent
Hardy, Peter... The Grange, Claines, Worcester
Hardy, Richard... Marchington, Uttoxeter
Hardy, William... Thistleton, Market Overton
†Hardy, W. H. C.... Letheringsett Hall, Holt, Norfolk
Hare, Joseph... Wilton Farm, Beaconsfield
†Hare, Sir J., Bart....
Hare, Sir Thos., Bt.... Stow Hall, Downham Market
Hare, Thomas W.... Berthddu, Llandinan
†Harewood, Earl of... Harewood House, Leeds
†Harford, J. B.... Stoke House, Stoke Bishop, Bristol
†Harford, W.... Barley Wood, Wrington, Bristol
Harker, James... Tibshelf, Alfreton
Harker, Rev. W.... Emmanuel Vic., Camberwell, S.
Harlock, Henry... Gt. Thurlow, Newmarket
†Harman, Hon. L. King.. Ballymena, co. Longford
†Harper, Latimer... Chilton Cottage, Hungerford
Harrett, R.... Kirkwhelpington, Newcastle-on-Tyne
Harries, Francis, jun.... Cruckton Hall, Shrewsbury
Harris, Charles T.... Knighton House, Leicester
Harris, Edward... Horbling Vicarage, Folkingham
Harris George Shirley... Leicester
Harris, John... Nottingham
Harris, John Dove... Ratcliffe, Leicester
Harris, John Dove, Jun.... Knighton, Leicester
†Harris, Lord... Belmont, Faversham
Harris, Samuel... Westcoates, Leicester
Harris, Thomas... Stonylane, Bromsgrove
Harrison, Col. Broadley... Kynastone, Ross
†Harrison, Daniel... Kendal
Harrison, John... Summerlands, Kendal
Harrison, John... The Willows, Leicester
Harrison, J., jun... Snelston Hall, Ashbourne, Derbys.
Harrison, J. T.... 3, Park Place Villas, Maida Hill
Harrison, Rev. J. H.... Bugbrooke Rectory, Weedon
†Harrison, Richard... Wolverton, Stony Stratford
Harrison, Rev. R. J... Caerhowell, Garthmyl, Salop
Harrison, Thomas... Belsay, Newcastle-on-Tyne
Harrison, Thomas... The Crescent, Leicester
Harrison, William H.... Oxendon, Northamptonsh.
Harrold, G. A.... Leicester
Harrowby, Earl of, K.G.... Norton Ho., Campden
Hart, Henry P.... Beddingham, Lewes
†Harter, Rev. G. G.... Cranfield, Newport Pagnell
†Harter, Jas. Collier... Broughton Hall, Manchester
Hartill, Jeremiah... Willenhall, Wolverhampton
Hartland, W. Jun.... Bodley, Westbury-on-Severn
Hartley, Gilferd Wm.... Rosehill, Whitehaven
Hartopp, Sir J. Bart.... Four Oaks Hall, Sutton
Harvey, Chas. W.... Walton-on-the-Hill, Liverpool
Harvey, John J.... Statenboro' House, Sandwich
†Harvey, Richard... Greenaway, Torquay
Harvey, Richard Hart... Harroldston, Haverfordwest
Harvey, William... Timworth, Bury St. Edmund's
Harward, John... Chaddesley Corbet, Kidderminster
Harwood, Thomas... Belstead Hall, Ipswich
Haslam, Charles... Basingstoke
†Haslewood, L. R.... Hendon Park, Highwood Hill
†Hassall, Geo.... Shelford Manor, Ratcliffe-on-Trent
Hassall, Joseph... Great Wigston, Leicester
Hassell, Rev. T.... Rearsby Rectory, Leicester
Hassall, Wm.... Bubney, Whithurch, Salop
Hatfeild, Chas. Taddy... Hartsdown House, Margate
Hatherton, Lord... Teddesley, Penkridge
Hatten, Robert C.... Hepworth, Scole
Hatton, William... Kingston, Tetsworth, Oxon
Havers, William... Beacon's Farm, Mountnessing
Haward, R.... Mells Hill, Halesworth
Hawarden, Viscount... Dundrum Castle, Cashel
Hawdon, William... Walkerfield, Staindrop
†Hawkesworth, R. S... Forest, Mountrath, Queen's co.
Hawken, Thomas... Mellingey, St. Issey, Cornwell
Hawkes, Thomas... Tiverton
Hawkins, C. S.... Over Norton House, Chip. Norton
Hawkins, Henry M.... Moorfields, Hereford
†Hawkins, T.... Bentley Hall, Ipswich
†Hawkins, Thos., jun.... Sugwas, Hereford
Hawthorn, W.... Benwell Cottage, Newcastle-on-Tyne
Haxby J. Barker... Belvoir Street, Leicester
†Hay, C. Anderson.. 17, York Ter., Rgnt's. Pk., N.W.
Hay, G. W.... Sudbury, Stoke-upon-Trent
Hayes, Henry... Stamford
Hayes, John Higson... Frodsham
†Hayne, John... 24, Gloucester Sq., Hyde Park, W.
Hayne, Col. Richard...
Hayter, Tom John... West Woodgates, Salisbury
Hayward, Frederick... Needham Market
Hayward, J. Curtis... Quedgeley House, Gloucester
Haywood, Edward W.... Sillins, Bromsgrove
Haywood, George... Derby
Haywood, Henry... Blakemere House, Hereford
Haywood, James, jun.... Derby
Hazlerigg, Sir A. Grey, Bt.... Noseley Hall, Leicester
Head, John... Orwell Works, Ipswich
Headlam, Morley. Whorlton, Darlington [nard Castle
†Headlam, Rt. Hon. E., M.P.... Gilmonby Hall, Bar-
Headly, Edward... 2, New Square, Cambridge
†Heale, H. Newton... Highfield, Hemel Hempstead
Healey, Edward Charles... Goldwynds, Dorking
Heard, Wm.... St. Margaret's, Ware
Heasman, Alfred... Angmering, Arundel
Heath, G. Y., M.D.... Newcastle-on-Tyne
Heath, John... Bickley House, Tenbury
†Heathcote, Capt. Eustace... Blanshard, Lyndhurst
†Heathcote, J. M.... Connington Cas., Stilton, Hunts.
Heatley, James H.... Engleton Hall, Penkridge
Heatley, John... Eaton, Market Drayton
Heatley, R. T.... Eaton Grange, Market Drayton
Heaton, Thomas... Alton, Cheadle, Staffordshire
Hedley, Thomas... Cox Lodge, Newcastle-on-Tyne
Hellier, Thos. Shaw... Rodbaston Hall, Penkridge
†Hellyer, G. W. M.... Tan-y-Garth, Bettws-y-coed
Helyar, Wm. Hawker... Coker Hall, Yeovil
Hemming, Richard... Bentley Manor, Bromsgrove
Hemming, Wm.... Coldicott, Moreton-in-the-Marsh
†Hempson, John A.... Erwarton Hall, Ipswich
†Hemsley, John... Shelton, Newark, Notts
Henderson, John... The Shrubbery, Sandwich
Henderson, John... Horsley Hill, South Shields

Henderson, W....Fowberry Maines, Belford
Henderson, William...Houghton le Spring, Durham
Hendy, James...Trenouth, Grampound
Heneage, Geo. H. Walker...Compton Basset, Calne
†Henley, Henry Cornish...Leigh House, Chard
Henley, Joseph J....Sherburn Lodge, Tetsworth
†Henley, Rt. Hon. J. W., M.P....Waterperry, Oxon
Henniker, Capt....Pippingford Park, Uckfield
Henniker Major, Hon. J., M.P..Woodlands, Ipswich
†Henning, James...
Henning, William L....Frome House, Dorchester
Henry, Frederick H....Lodge Park, Straffan, Ireland
Henry, Capt. James...Blackdown House, Petworth
Henty, Robert...Rothley Temple, Loughborough
Hepburn Thomas...Clapham Common, S.
Hepworth, Joshua...Rogerthorp Hall, Pontefract
Herbert, E....Llansantffraed House, Abergavenny
Herbert, Edmund...Powick, Worcester
†Herbert, John Maurice...Rocklands, Ross
†Herbert, Maj.-Gen. Hon. P. E....43, Charles St., W.
Herbert, Thos....86, Welford Road, Leicester
Hercy, John...Cruchfield House, Maidenhead
Herrick, Wm. Perry...Beau Manor Park, Loughboro'
†Herries, Lord...Everingham Park, Pocklington
Herring, Francis...Braxted Park Farm, Sevenoaks
Hersee, Miss...Westgate, Chichester
Hervey, Lord A., M.P..Ickworth, Bury St. Edmund's
Hervey, G. H. W....Ickworth Rectory, Bury St. Edmund's
†Heseltine, E....6 A, Austin Friars, E.C.
Hesketh, Sir T. G., Bt., M.P...Rufford Hall, Ormskirk
Heslop, Rev. Gordon...Cossall, Nottingham
Heslop, Isaac...Urpeth, Fence Houses
†Hester, G. P....Town Clerk's Office, Oxford
Hetherington, J. R....Carleton, Carlisle
Hetherington, Robt....Manor Ho., Ropley, Alresford
Hewer, William...Hill House, Northleach
Hewer, Wm....Sevenhampton, Highworth, Wilts
Hewertson, Nelson...Newport, Monmouthshire
Hewett, James...Posbrooke, Titchfield
Hewitt, James...King James Street, Gateshead
Hewson, John Dale, M.D....Coton Hill, Stafford
Hext, Thomas...Trewarren, St. Austell
Heygate, Captain E. N....Buckland, Leominster
Heygate, Robert H. J....Castletown, Carlisle
†Heytesbury, Lord...Heytesbury, Wilts
†Heywood, J....26, Palace Gardens, Kensington, W.
Heywood, Wm. H....Dunham Massey, Altrincham
†Hibbert, John...Braywick Lodge, Maidenhead
†Hibbert, P. E. T....34, Dover Street, W.
Hibbert, T. J...Broughton, Newton-in-Cartmell
†Hibbert, Washington...34, Dover Street, W.
Hicken, John...Dun Cow Hotel, Dunchurch, Rugby
†Hicks, Francis...Halstead, Sevenoaks
Hicks, G. H. T....Hill Grove House, Wells, Somerset
Hicks, L...Paddock Lodge, Kentish Town, N.W.
†Hicks, Thomas...Halstead, Sevenoaks
Hickman, Capt. W. T....Woodlands, Havant
Hickson, Richard...Hougham, Grantham
Higginbotham, J....Pensax Court, Tenbury
Higginbotham, Samuel...Killermont, Glasgow
Higgins, H....Woolaston Grange, Lydney
Higgins, Col. Wm. B. Cole...Pict's Hill, Bedford
†Higginson, Edmund...Saltmarsh, Bromyard
Higginson, John...Humberstone Road, Leicester
Highfield, George...Blencogo House, Wigton
Hilder, John...Sandhurst, Kent
Hilder, William...Tenterden
†Hildyard, Thomas, B. T., M.P...Flintham, Newark
Hill, Rev. Abraham...St. George's, Leicester
Hill, Henry...52, Queen's Gate Terrace, S.W.
Hill, Henry...Thornton, Pickering
Hill, Rev. J....The Citadel, Hawkstone, Shrewsbury
Hill, Rev. R. P....Bromesberrow Rectory, Ledbury
Hill, Richard...Orleton Court, Ludlow
Hill, Hon. T. H. Noel...Berrington, Shrewsbury
†Hill, T. Rowley..Catherine Hill House, Worcester
Hill-Trevor, Lord A. E., M.P...Brynkinalt, Chirk
Hilliam, Capt. Thomas...Willesby Hall, Spalding
Hilliard, William Edw....Cowley House, Uxbridge
Hilton, Henry...Sole St. Ho., Selling, Faversham
Hilton, Stephen Musgrave...Brambling, Wingham
Hilton, Capt. Thos....Nackington Ho., Canterbury
†Hinde, J. H....Acton House, Felton, Northumb.
†Hippisley, John...Stone Easton, Bath
†Hipwell, G. M....Elmore Lodge, Sutton, Surrey.
Hitchcock, H....Chitterne All Saints, Heytesbury
Hitchcock, T. P...Southgate St, Bury St. Edmund's
Hitchcock, W. H....Miserden Park, Cirencester
Hitchman, John, M.D....Mickleover, Derby
Hobbs, Charles...Maisey Hampton, Cricklade
Hobbs, William...Derward's Hall, Bocking, Essex
Hoblyn, W. Paget...The Fir Hill, St. Columb
Hobson, J....Kilkea, Castle Dermot, Kildare
Hobson, John George...Curlew Lodge, Long Sutton
Hockenhull, John...The Flax Yards, Tarporley
Hockin, John...Broomhill, Bude, Cornwall
Hodges, Frank...Mayfield, Leicester
Hodges, George Henry...Stoneygate, Leicester
Hodges, John Edward...Stoneygate, Leicester
Hodges, Thomas W....Mayfield, Leicester
Hodgkinson, Enoch...Morton Grange, Retford
Hodgkinson, Grosvenor, M.P....Newark, Notts
Hodgkinson, Richard...Osberton Grange, Worksop
Hodgson, Arthur....Eastwood Lodge, Leamington
†Hodgson, E. G...Charsfield Hall, Wickham Market
†Hodgson, Henry Tylston...Harpenden, St. Albans
Hodgson, Isaac Scott...Sodylt Hall, Rhuabon
Hodgson, James...242, Netherfield Road, Liverpool
Hodgson, Joseph...Blyth, Cumberland
Hodgson, R...Crofton Mills, Blyth, Northumberland
Hodgson, Richard...Chingford, Essex
†Hodgson, William...Gilston Park, Herts
Hodgson, William...Grimston, Tadcaster
†Hoffschlaeger, J. F....Weisin, bei Mecklenburg
Hogg, James...Buckton, Belford, Northumberland
Hogg, William...Mitford Steads, Morpeth
Hogge, William...Thornham Hall, Lynn
Hoggins, Thomas...Trafford Lodge, Chester
†Holbech, Rev. Chas. Wm....Farnborough, Banbury
Holben, R. Rowley...Barton, Cambridge
Holborow, Daniel B....Knockdown, Tetbury
Holcombe, Rev. G. F....Sherwood Lodge, Nottingham
Holder, W...Yearston Ct., Upper Sapey, Worcester
Holding, Henry...Fardington, Alton
Holden, Rev. J....Lackford, Bury St. Edmund's
Hole, James...Knowle, Dunster

Hole, James...Muskham Woodhouse, Newark
†Holland, Dr. Chas....St. Chad's, Lichfield
Holland, Francis D....Cropthorne Court, Pershore
Holland, William...Broxton, Chester
Holland, William...Streethay, Lichfield
Holliday, James...Lord Street, Liverpool
†Hollings, James C...Snitterfield, Straford-on-Avon
Hollings, John Albert...The Hillend, Hereford
Hollingworth, John...Market Street, Leicester
†Hollist, Hasler...Lodsworth, Petworth
Holloway, Horatio...Marchwood, Southampton
Holloway, Thos....Tittenhurst Lodge, Sunninghill
†Holloweg, M. de B....Runorva, Nakel, Prussia
Holmden, James...Marlpit Hill, Edenbridge
Holme, John...Park Side, Milnthorpe
†Holmes, Gervas...Brockdish Hall, Scole
Holmes, Rev. John...Brooke Hall, Norwich
Holmes, John...Globe Lane, Norwich
Holton, William Fifield...Cleeve Prior, Evesham
Homer, Thomas A....Tolpuddle, Dorchester, Dorset
Homfrey, S....Glenuske Park, Caerleon, Newport
Hone, Henry...Stoke Orchard, Cheltenham
†Hony, Rev. P. F....
Honywood, Mrs....Marks Hall, Kelvedon
Honywood, William...
†Hood, Sir Alex. A., Bt., M.P..Bicknoller, Taunton
†Hood, Capt. Hon. A...Cumberland Lodge, Windsor
Hooker, John...Oatlands Park, Walton-on-Thames
Hooper, George...Cottington Court, Deal
†Hooper, R. N....Llansanor Ct., Cowbridge, Glamr.
†Hope, Joseph...Whoof House, Carlisle
Hope, Samuel Pierce...Marchwiel Hall, Wrexham
Hope-Edwardes, Thos. Hen....Moore Park, Ludlow
†Hopkins, Henry...Burnside, Van Dieman's Land
Hopkins, John...Tidmarsh House, Reading
Hopton, Rev. John...Canon-Frome Court, Ledbury
†Horley, Thomas, jun....The Fosse, Leamington
†Hornby, Rev. Robt....The Parsonage, Shrewsbury
Hornby, Rev. W....St. Michael's on Wyre, Garstang
Hornby, W. H., M.P...Shrewbridge Hall, Nantwich
Horncastle, Henry...Edwinstowe, Ollerton, Notts.
Horne, Thomas...Moreton-in-the-Marsh
†Horner, James B....Lincoln
Horner, John G....Martins Town, Dorchester
Horner, Rev. John...Mells Park, Frome, Somerset
Horniblow, William T. Jun....Ripple, Tewkesbury
Hornsby, Richard...Spittle Gate, Grantham
†Hornyold, J. V...Blackmore Park, Upton-on-Severn
Horrell, John...Stevingdon, Bedford
Horsfall, T. Berry, M.P....Bellamour Ha., Rugeley
Horswell, James...Bura's Hall, Lewdown, Exeter
Horton, George...Harley, Much Wenlock, Salop
Horton, Thomas...Harnage Grange, Shrewsbury
Horton, Capt. W., R.N...Livermere, Burt St.Edmds.
†Horton, Wm. Thomas...Seamer House, Yarm
Horwood, Matthew...27, Leadenhall Street, E.C.
Hoskin, Samuel...Loggan Mill, Hayle
†Hoskins, Thos....Haselbury, Crewkerne, Somerset.
Hoskyns, Chandos Wren...Harewood, Ross
Hoskyns, Rev. Henry...
†Houblon, J. A....Hallingbury, Bishop's Stortford
†Houblon, Richard Archer...Coopersale, Epping
Houghton, J. S...Refreshment Rooms, Landport
Houghton, Thomas...Hemshill Manor, Nottingham
Houlder, Edwin...Fernwood, Sutton, Surrey
†Howard, Charles...Biddenham, Bedford
Howard, Hon. C. W. G., M.P....Brampton
Howard, Edward J....Rise Farm, Nocton, Lincoln
Howard, Edward M., Witchingham, Norwich
†Howard, Henry...Greystoke Castle, Penrith
†Howard, Hon. James...Hazelby, Newbury
†Howard, James...Bedford
†Howard, Robert...Broughton Hall, Wrexham
Howard, R. G. F....Temple Bruer, Lincoln
Howard, Wm....Windsor Terrace, Taunton
Howden, Alexander...Murston Court, Pembridge
How, Rev. James...Broughton, Huntingdon
Howe, Earl...Gopsall, Atherstone
†Howell, Henry...Coates, Cirencester
Howell, John...Ewen, Cirencester
Howes, E., M.P....Morningthorpe, Long Stratton
Howland, A. R....Ludesden House, Thame
Howlett, John...Bowthorpe Hall, Norwich
†Hubback, Joseph...Liverpool
†Hubbard, Egerton...Addington Manor, Winslow
†Hubbard, Wm. Egerton...St. Leonard's, Horsham
Hubbersty, H.A....South Collingham, Newark
Hubbersty, W. Philip...Wirksworth, Derbyshire
Hubie, Robert...Barlby Grove, Selby
Huddleston, Ferdinand..Sawston Hall, Cambridge
Hudson, Charles H....Sandall Grove, Doncaster
Hudson, John...Castleacre Lodge, Brandon
Hudson, Thos....Adderley, Market Drayton
†Hudson, T. Moore...Castleacre, Brandon
Hudspith, W....Beltonfoot Cottage, Wishaw, N.B.
Huggup, James...West Sleekburn, Bedlington
Hughes, Alfred...Thorness, W. Cowes, Isle of Wight
†Hughes, Hugh...Donro House, Mt. Ephraim
†Hughes Hugh R....Kinmel Park, St. Asaph's
Hughes, Hugh Robert...Ystrad, Denbigh
Hughes, John...Britannia Square, Worcester
Hughes, John, jun....
Hulme, J. H...Cliff House, Curbar, Calver, Sheffield
†Hulme, W....The Bank, Pembroke, South Wales
†Hulse, Charles...Hall Grove, Bagshot
Human, Nathaniel H....Isleham, Soham
†Humberston, P. S.....Mollington, Chester
†Hume, Charles T....Waterloo Terrace, Bridgnorth
Humfrey, Heber..Kingstone Farm, Ashbury, Shriv.
Humphreys, Henry...Woodhouse, Loughboro'
Humphries, E....Pershore
Humphries, John...Hampen, Andoversford
Humpidge, Thos..Malswick, Newent, Gloucester
Hunt, A. H....Birtley House, Chester-le-Street
Hunt, G....Frenchwood, Preston, Lancashire
Hunt, Rowland...Kibworth Hall, Leicestershire
Hunt, Thomas...Thornington, Coldstream
Hunt, William...Deeping St. Nicholas, Spalding
Hunt, William...Leicester
Hunter, Lt.-Col. Charles..Mount Severn, Llanidloes
Hunter, Hen. Launoy...Beech Hill, Reading
Hunter, John Joseph..Wickham Grange, Gateshead
Hunter, Samuel T....Old Court, Abergavenny
†Hunstman, Benjamin...West Retford, Notts
†Hurdman, J. E....Mareham le Hill, Horncastle
Hurle, Joseph Cooke...Brislington, Bristol

Hurlston, Wm....Heathcote, Wasperton, Warwicksh.
Hurrell, Henry...Harston, Cambridge
Hurrell, William...Newton, Cambridge
Hurt, Albert F....Alderwasley, Derby
†Huskinson, Thos....Epperstone, Southwell
Hussey, Edward...Scotney Castle, Lamberhurst
†Hussey, Rich. Hussey...Taplow House, Maidenhd.
Hutchinson, James...Cowley Manor, Cheltenham
Hutchinson, Col. Hon. H. K...Weston Ho., Towcester
Hutchinson, John...Appleton Lodge, Warrington
Hutchinson, John...Brougham Castle, Penrith
†Hutchison, Robert...Carlowrie, Kirkliston, N.B.
Hutley, Jonathan...Rivenhall Hall, Witham
Hutt, John...Water Eaton, Oxford
Hutt, Rt. Hon. Sir W., K.C.B., M.P....Gibside Hall, Gateshead
Hutton, William...Gate Burton, Gainsborough
Huxtable, Ven. Archd...Sutton Waldron, Blandford
†Huyshe, Rev. J....Clysthydon Rectory, Collumpton
Hyde, J. T., M.A....Needham Market
Hyett, John Edw....Haydon's Elm, Cheltenham
Hyett, W. H....Painswick, Gloucestershire
Hylton, Lord...Heath House, Petersfield

I.

Iles, Daniel...Fairford Retreat, Fairford
Iles, John...Binbrook Hill, Market Rasen
Impey, William...Broomfield Hall, Chelmsford
Inge, Chas. Henry...Whittington Hurst, Lichfield
Inge, Lieut.-Col. Wm....Thorpe, Tamworth
Ingham, William...Monkton Mains, Ripon
Ingham, William...Armley, Leeds
Ingram, Hugo F. M....Hoarcross, Rugeley, Staffords
†Ingram, John A...Wylye, Heytesbury
†Ingram, Joseph...Pleck House, Accrington, Lanc.
Ingram, Thomas...Great Wigston, Leicester
†Innes, William...Field Place, Warnham, Horsham
Innocent, Arthur...Kibworth Beauchamp, Leicester
Insole, James Harvey...Ely Court, Llandaff
Ion, J. W....Bury St. Edmund's
Isaacson, John...Clare, Suffolk
Isaacson, Wm. Parr...Newmarket
Isham, Sir C. E., Bart...Lamport Hall, Northampton
Isham, Rev. R....Lamport Rectory, Northampton
Isherwood, Arthur B....Coundon Hall, Coventry
Islip, Francis W...Collegiate House, Leicester
Ive, John G....The Trenches, Langley, Slough
Izon, John B....Walsgrave-on-Sowe, Coventry

J.

Jackson, Daniel...Chadwell Place, Grays, Essex
Jackson, Matthew...Bilsthorpe, Newark, Notts
Jackson, P. R...Blackbrook, Gresmont, Hereford
Jackson, Thomas...Eltham Park, Kent
†Jackson, William...Oak Bank, Carlisle
Jackson, William Fenwick...Newcastle-on-Tyne
Jackson, Wm. Kay...Barbot Hall, Rotherham
†Jacobsen, C. C....Whatfield, Ipswich
Jacson, Chas. Roger...Barton, Preston, Lancashire
James, Edward...Holeyn Hall, Newcastle-on-Tyne
James, Isaac...Tivoli, Cheltenham
James, James William...Mappowder, Blandford
James, J. A...Bridge Town Farm, Stratford-on-Avon
James, Richard...High Street, Haverfordwest
James, T....Otterburn Castle, Newcastle-on-Tyne
James, Thomas...Shushions Manor, Church Eaton
James, Sir Walter C., Bt....Betteshanger, Sandwich
†James, Capt. Wm. E....Barrack Lodge, Carlisle
†Jaques, Leonard..Wentbridge House, Pontefract
Jaques, R. M....Easby Abbey, Richmond, Yorks.
Jaques, T. G....Blacktoft, Howden, Yorkshire
†Jarrom, Joseph...Leicester
Jarvis, Sir S. Raymond, Bt...Cove Cottage, Ventnor
Jarvis, T. A....Lower Collaton, Kingsbridge, Devon
†Jay, John...46, West Seventeenth St., New York
Jefferson, Capt. J...14, Leadenhall Street, E.C.
Jefferson, Rev. J. Dunnington..Thicket Priory, York
†Jefferson, Robert...Preston Hows, Whitehaven
Jefferson, Skelton...Preston Hows, Whitehaven
Jefferys, N. N...Hollybrook Ho., Shirley, Southamp.
†Jegon, Trew...Slough
Jekyll, J....Carholme Terrace, Newland, Lincoln
Jenkin, H B....Cotton Farm, Whitchurch, Salop
†Jenkins, John B....Kingstone House, Abingdon
Jenkins, Richard David...The Priory, Cardigan
†Jenkinson, Sir George, Bt....Eastwood, Berkeley
Jenkinson, Joshua...Anfield, Cockermouth
†Jenner, George...Parsonage House, Udimore, Rye
Jennings, R....Smith & Co., Druggists, Carmarthen
Jervis, Hon. E. Swinfen...Aston Park, Staffordsh.
†Jervoise, F. E. J....Herriard Park, Basingstoke
Jessop, Joseph...Grove Farm, Chiswick, W.
Jillings, F. V....Saxham, Bury St. Edmund's
Jillings, John...Little Saxham, Bury St. Edmund's
Jillings, W. Harvey...The Nunnery, Thetford
†Jobez, Charles...17, Boulevard Madeleine, Paris
Jobling, Edward...Hill Top Cottage, Carlisle
Jobson, William...Newton Barns, Chathill
†Jocelyn-Ffoulkes, Major...Eriviatt, Denbigh
†Jodrell, Sir Edw. R., Bt....64, Portland Place, W.
Johnson, A. H....Manor House, Acton, W.
Johnson, A. H., jun...Hanger Hill Farm, Ealing, W.
Johnson, Arthur Henry...Appleby, Brigg
Johnson, B. B....Withersfield, Newmarket
Johnson, Charles W....32, Mark Lane, E.C.
Johnson, Cuthbert Wm....Waldronhurst, Croydon
Johnson, Edward...The Deanery, Chester-le-Street
Johnson, E. W....Chichester
Johnson, Francis Dixon...Aykleyheads, Durham
†Johnson, George...Blaco Hill, Retford, Notts
†Johnson, Rev. H. L....Binderton Ho., Chichester
Johnson, Joseph...High Street, Windsor
Johnson, Rev. P....Wimborthy, Chumleigh, Devon
†Johnson, R. W...Bricklehampton Hall, Pershore
Johnson, T. C....Chevet, Wakefield
Johnson, Thomas...Halton Grange, Runcorn
Johnson, Thomas...The Hermitage, Frodsham
†Johnson, Thomas...Whittlesea, Cambridgeshire
Johnson, T. Fielding...Stoneygate, Leicester
Johnson, Walter F....Leicester
Johnson, Wm. H....Old Hall, Braunston, Leicester
†Johnston, Alex. R....The Grove, Yoxford, Suffolk

Johnston, J. Lindsay...Crondall, Farnham, Surrey
Johnstone, Edward...3, King's Bench Walk, E.C.
†Johnstone, Rev. George...Broughton, Hunts
†Johnstone, J. C. H....Hardwick Hall, Durham
Joicey, Edward...Newcastle-on-Tyne
Joicey, John...Urpeth Lodge, Fence Houses
Jollands, William D....Buxshalls, Lindfield, Sussex
Jonas, George...Dunsford, Cambridge
Jonas, George...Ickleton, Saffron Walden
Jonas, John Carter...27, Market Place, Cambridge
†Jonas, William...Heydonbury, Royston
Jones, Benjamin..Talardd, Llanybyther, Carmarthen
†Jones, David, M.P....Pantglas, Carmarthen
Jones, Edward...6, York Crescent, Clifton, Bristol
Jones, G...Whitley Ct., Upton St. Leonard's, Glouc.
Jones, George...Stareton, Kenilworth
Jones, Hugh...V.S., Caernarvon
†Jones, H. P....Portway House, Warminster
Jones, J. Bowen...Eusdon House, Baschurch, Salop
†Jones, James Cove...Loxley, Warwick
†Jones, John...Blaeno's, Llandovery, S. Wales
Jones, John...Bryn Adda, Dolgelly
Jones, John...Maesypandy, Tal-y-llan, Merioneth
†Jones, J. E....Springfield, Braunton, Hereford
Jones, R. P....The Hermitage, Whitchurch, Salop
Jones, Thomas...Kiln Green, Malpas
†Jones, Wm....Harrington, Shiffnal
†Jones, Sir W., Bt....Cranmer Hall, Fakenham
†Jones, W. B....Lissdare, Clonakilty, County Cork
Jones, W. H...Cannon Bridge, Madley, Hereford
Jordan, John S....Elmswell, Driffield
Jordan, Wm....Charlton Kings, Cheltenham
Josling Geo. F....Berners Roding Hall, Dunmow
Jowitt, Christopher...Palterton, Chesterfield
Jowett, Rev. J. F....Kingston Bagpuze, Abingdon
Juckes, Mrs. Mary...Cotwall, Wellington, Salop
Judkins, C. T., Mrs....4, Ludgate Hill, E.C.
†Justice, Henry...Hinstock, Market Drayton

K.

†Karslake, Rev. W. H.....Mesham, Southmolton
†Kay, J. R....Bass Lane House, Bury, Lancashire
Kay, R....Forcett Valley, Darlington
Kearsey, Charles...Glewstone, Ross
Keary, H. W....Aldenham, Bridgenorth, Salop
Keeling, Charles...Congreve, Penkridge
Keeling, Chas. R....Yew Tree Farm, Penkridge
†Keene, Rev. C. E. R....Swincombe Ho., Nettlebed
Keep, Richard...Burghfield Place, Reading
Kekewich, S. Trehawke, M.P....Peamore, Exeter
Kelham, Robert....Bleasby Hall, Southwell
Kelly, John...Plymouth
†Kelsall, Henry, jun....Pinnacle Hill, Kelso, N.B.
†Kemble, Horatio...Potter's Bar, Barnet, Herts
†Kemble, Thomas...Runwell Hall, Chelmsford
Kemp, Francis...Saddington, Market Harboro'
Kemp, Jesse....Thurlby Grange, Alford
Kendrick, Edward...Weeford, Lichfield
†Kennard, Adam S....Dawpool, Birkenhead
†Kennaway, Sir John, Bart....Escot, Honiton
Kennedy, David...Oriental Club, W.
Kennedy, Myles....Burton Cottage, Ulverstone
Kennedy, Rt. Hon. T. F....Dalquharran Castle, N.B.
Kenrick, George...Thurgarton Hill, Southwell
†Kensington, Edward Thomas..Moolham, Ilminster
†Kenyon, Hon. E....Maesfen, Whitchurch, Salop
†Kerrich, John...Geldeston Hall, Beccles
Kerry, T. R....Lackford, Bury St. Edmund's
Kersey, Clement....Whitton, Ipswich
†Kesterton, Thomas...Sutton, S.
Kett, George Samuel...Brook House, Norwich
†Kettle, Geo. Mackenzie...Dallicott Ho., Bridgenorth
Key, Sir Kingsmill Grove, Bt....95, Newgate St., E.C.
Keyes, Hen. James...Ashingdon, Rochford, Essex
†Keyworth, Henry Joseph...Cottesford Pl., Lincoln
†Keyworth, J. R. Haldenby..Greestone Ho., Lincol.
Kibble, Thomas...Green Trees, Tunbridge
Kilpin, W. Wells...Bickerings Park, Woburn
Kimber, Jas. Weaving...Tubney Warren, Abingdon
Kimber, Thomas....Tracey, Enstone, Oxon.
†Kimberley, Earl of...Kimberley, Wymondham
Kindersley, E. Leigh...Syward Lodge, Dorchester
King, A. C....Desning Hall, Bury St. Edmund's
King, C....North Lodge Farm, Potter's Bar, Barnet
King, Chas. Allen...Branksome Dene, Bournemouth
King, Edmund...Ashley Hall, Newmarket
King, Fdk. W....St. Mary's Sq., Bury St. Edmund's
King, George...Saffron Walden
†King, George...East Haddon, Northampton
†King, John G....Beedon, Newbury
†King, John L....Thorp Abbots, Scole Inn, Norfolk
King, John Lyles...Camois Hall, Newmarket
King, Rev. J. Meyers...Cutcombe Vicarage, Dunster
King, Hon. J. P. L., M.P....Woburn Pk., Chertsey
King, Richard H.....Wooperton, Alnwick
King, Richard King Meade...Walford, Taunton
King, Robt. William...Brinkley Hall, Newmarket
King, S....Bockhampton Farm, Lambourne, Berks
King, Thomas...Preston, Bildeston, Suffolk
King, Walter J....Suffolk Chronicle Office, Ipswich
King, William...Barton, Bury St. Edmund's
King, W. C....Warfield Hall, Bracknell
Kingdon, Rev. S. N....Bridgerule Vicar., Holsworthy
Kingdon, Samuel...Lynch, Thorverton
Kingsbury, E. W....38, Bryanston Street, W.
Kingsby, Thomas...Boarscroft, Tring
†Kingscote, Col. R. N. F., M.P...Kingscote, Glouc.
†Kingsmill, Wm. H....Sydmonton Court, Newbury
†Kingsnorth, Alfred...Great Chart, Ashford, Kent
†Kingsnorth, Edward...Brookland, New Romney
Kingston, Samuel, Spalding
Kinloch, Colonel...Logie, Kirriemuir, N.B.
Kinnaird, Lord...Rossie Priory, Inchture, Perthshire
†Kirk, R....Gale Bank, Leybourne, Wensleydale
Kirkaldie, Viscount...Windsor
Kirkby, D. E....Llaufeudigaid, Towyn, Merioneths.
Kirkby, Thomas...Cuxwold, Caistor
Kirkham, Thomas...Biscathorpe House, Louth
Kirkland, Sir John, Bt....17, Whitehall Place, S.W.
Kirkpatrick, Capt. John ...Monk's Horton, Hythe
Kirwan, J. Stratford..Moyne, Ballyglunin, co. Galway
Kitson, James...Leeds
Kitson, William...Hengrave, Torquay
Knapping, Dale...South Shoebury, Southend

Knatchbull, Rev. W...Cholderton Lodge, Amesbury
†Knatchbull, Wm....Babington, Frome, Somersets.
†Knight, A. J. R. B...Downton Castle, Leintwardine
Knight, Edward...Chawton House, Alton
†Knight, E....High Leadon, Newent, Gloucestersh.
Knight, Edward W....Newton Harcourt, Leicester
Knight, Capt. Gregory..Glen Parva Manor, Leicester
Knight, John...Widnes, Warrington
Knight, John...Forthampton, Tewkesbury
Knight, Maj. Joseph...Glen Parva Manor, Leicester
Knight, Josiah...Milwich, Stone, Staffordshire
Knight, Thomas...Norlington, Lewes
Knight, Rev. Thos. H...Broadhayes House, Honiton
†Knighton, SirW., Bt...Blendworth Ldg., Horndean
Knollys, Gen. Sir W., K.C.B...Blount's Ct., Henley
Knollys, J. E....Fitzhead Court, Taunton
Knowles, James...Wetherby
Knowles, William...Gloucester
Knox, Octavius N....Corgrig Lodge, Foynes, Ireland
Kyngdon, F. Boughton...The Bank, Margate
Kyrke, Rich. Venables...Stansby Lodge, Wrexham

L.

Lacey, Robert...Hoton, Loughborough
†Lake Edward....Hill Side, Strood, Kent
Lake, James...Newlands, Teynham, Sittingbourne
Lake, Robert...Milton, Canterbury
Lakin, Henry...Link End, Malvern
Lamb, R. O....Axwell Park, Newcastle-on-Tyne
Lambe, John...Hopefield, Eccles, Manchester
†Lambert, Chas....Sunk Island, Otteringham, Hull
†Lambert, H. T....Sandhills, Bletchingley, Redhill
Lambert, Wm. Chas....Misterton, Crewkerne
Lamin, William...Bestwood Park, Notts
†Lancaster, T....Bownham Ho., Stroud, Gloucestsh.
Lane, Ebenezer....Honey Street, Marlborough
Lane, John...Wenlock Brewery, City Road, E.C.
Lane, Lieut.-Col. J. H. B....Lilly Hill, Bracknell
†Lane, William...Broadfield, Northleach
Lang, Thomas M....Barrington Court, Ilminster
Langdale, Hon.C...Houghton Hall, Market Weighton
†Langdale, Lady....Eywood, Kington, Herefordsh.
Langdale, Sampson....Espley House, Morpeth
Langham, Herbert...Cottesbrooke, Northampton
Langlands, John Charles...Old Bewick, Alnwick
†Langton, W. H. P. Gore, M.P....Newton Pk., Bath
Large, William....Taywell House, Goudhurst
Larking, John Wingfield...The Firs, Lee, Kent
Larkman, George J....Fritton, Lowestoft
Larkworthy, J. L....Worcester
†Lascelles, Hon. G. E..Moore Hill, Harewood, Leeds
Latham, Geo. William...Bradwall Hall, Sandbach
Laud, B. H....Bury St. Edmund's
Lauder, Joseph...Burton, Christchurch
Laverack, Samuel....Chapel Haddlesey, Selby
Laverack, Samuel S....Redness Hall, Goole
†Law, Rev. R. V....Christian Malford, Chippenham
Lawes, John Bennet..Rothamsted Park, St. Albans
†Lawford, Thomas, jun....London, Canada West
†Lawley, Hon. & Rev. S. W...Escrick Rectory, York
Lawrence, Charles...Cirencester

†Lawrie, Andrew...Mount Mascal, North Cray
†Lawson, C...Borthwick Hall, Gorebridge, N.B.
†Lawson, Chas., jun...34, George Square, Edinburgh
Lawson, E...Redesdale Cottage, Newcastle-on-Tyne
Lawson, Rev. Edw....Longhirst Hall, Morpeth
Lawson, Sir Wilfrid, Bart....Arkleby Hall, Aspatria
†Lawson, William...Brayton Hall, Carlisle
Lay, Rev. John Ward...Hele, Ashburton
†Lay, John W...Walcott's, Great Tey, Essex
Laycock, Joseph...Seghill House, Northumberland
Lea, James...Dodecote Grange, Market Drayton
Lea, John Wheeley...Stanfield House, Worcester
Lea, Joseph..Grove Mount, Davenham, Northwich
Leach, Henry...Corston, Pembroke
Leach, John...Ivy Tower, Tenby
Leader, Nicholas, M.P..Dromagh, Bonteen, Ireland
Leadbeater, John B....Thorpe, Satchville, Milton
Leamon, Robert...Whitwell, Reepham
Leather, George...Knowsthorp Hall, Leeds
Leather, Simeon...Delamere Lodge, Northwich
†Leaver, Francis...Longnor Hall, Penkridge
†Lechmere, Sir E. A. H., Bt., M.P..Upton-on-Severn
Le Cornu, Charles Philip...Trinity Manor, Jersey
Ledger, Reuben..Grove House, W. Derby, Liverpool
Le Feuvre,, H. J...Les Niemes, St. Peters, Jersey
†Le Grande, Emile..Nicolas Le Grand, Switzerland
Le Grice, Henry...Market Hill, Bury St. Edmund's
Lee, Charles...Grantley Hall, Ripon
Lee, Capt. John...Woolley Firs, Maidenhead
Lee, J. Bunting..Stocksfield Hl., Stocksfield-on-Tyne
†Lee, J. Lee...Dillington House, Ilminster
Lee, Joseph...Dilston, Corbridge, Northumberland
Lee, Joseph Henry...Redbrook, Whitchurch, Salop
Lee, Matthew...Wester Hall, Hexham
Lee, Thomas...
†Lee,Vaughan H....Lanelay, Llantrissant, S. Wales
Leedham, William...Andover
Leeds, Henry...Stibbington, Wansford, Northampt.
†Leeds, Robt....Lexham, Castleacre, Brandon
Leeke, R....Longford Hall, Newport, Shropshire
Lees, Charles...23, Philpot Lane, E.C.
Lees, John...Reigate
Lees, William...Blacon Hall, Chester
†Leese, Charles Stuart...Divan Court, Faversham
Le Gallais, Albert...La Moie House, Jersey
Legard, Capt. James A....Cowes, Isle of Wight
Legg, Thomas Fry...Burton Bradstock, Bridport
Leggatt, H. B....Brownwich, Fareham
Leggatt, S. B....Crofton, Titchfield
Legge, Benj....Court Ho., Litton Cheney, Dorchester
Legh, G. Cornwall, M.P....High Legh Hall, Knuts.
Leigh, F. A...Rosegarland, Foulksmill, co. Wexford
Leigh, John Gerard...The Hoo, Luton
Leigh, John Shaw...The Hoo, Luton
Leigh, Joseph...Belmont Hall, Northwich
Leighton, Sir Baldwin, Bart....Loton, Shrewsbury
Leighton, Robert...Thistleyhaugh, Morpeth
†Leith, A....Glenkindie, Inverkindie, Aberdn.
Lempriere, Rev. William...Rozel Manor, Jersey
Leney, Charles...Leavers, East Peckham, Kent
Lennard, Col. J. F...Wickham Court, Bromley, S.E.
†Lennard, Sir T. B., Bt...Belhus, Avely, Romford, E.
Lennox, William...Six Mile Bridge, Newc.-on-Tyne

Leslie, Charles Powell, M.P....Glasslough, Ireland
†Lethbridge, Charles...Eastbrook House, Taunton
Levett, William...Glassenbury, Cranbrook
Lewes, Col. John...Llanliar, Talsarn, Carmarthen
Lewes, Rev. Thomas...Taynton, Burford, Oxon
Lewis, David...Stradey, Llanelly, Carmarthen
Lewis, Edward...Pickhill Hall Farm, Wrexham
Lewis, I. H....Gallants Ct., East Farleigh, Maidstone
Lewis, John Lennox G. R....Henllan, Narberth
Lewis, Rich. Ed...Weston, Monk Hopton, Bridgnth.
Lewis, S....Audley, Newcastle-under-Lyme
Lewis, Thomas...Norchard, Tenby
Lewis, T. F....Newport, Monmouthshire
Lewis, W. H....Clynfiew, Newcastle Emlyn
Lewis, Wyndham W....Llanishew House, Cardiff
†Lewthwaite, George...Broadgate, Broughton in F.
Lichfield, Earl of...Shugborough, Staffordshire
Liddell, Hon. H. G., M.P,...Ravensworth Castle
Lieusley, Thomas...Doddington, Lincoln
Lightfoot, F. L....Market Drayton, Salop
Linaker, P....Norton Hill, Preston Brook, Cheshire
Lindley, Urban...Radmanthwaite House, Mansfield
Lindsay, Col. R. Loyd, M.P....Lockinge, Wantage
Lindsell, Lieut.-Col...Fairfield House, Biggleswade
Linley, William...Ham Common, Surrey
†Linton, Rev. J....Hemingford Ho., St. Ives, Hunts
Lintott, Wm....Holmbush, Slinfold, Horsham
Linzee, Robert G....Jermyns, Romsey
Litchfield, John...Epperstone, Nottingham
Little, Edward...Lanhill, Chippenham
Little, Hack Magnus...Elmington, Oundle
Little, Wm....Vigo House, Chester-le-Street
Littledale, Harold...Liscard, Liverpool
Livesey, Rev. Thos....Stourton Hall, Horncastle
†Llewellin, R...Tregwynt, Fishguard, Pembrokesh.
Llewellyn, Wm....Courtcolman, Bridgend, S.Wales
†Lloyd, Arthur P....Shawbury, Shrewsbury
Lloyd, Edw. Harvey...Aston Hall, Oswestry
Lloyd, Francis...Foundry, Worcester
Lloyd, George Woodall...Whitchurch, Monmouth
Lloyd, J. A....Leaton Knolls, Shrewsbury
Lloyd, John...Astwick Manor House, Hatfield
Lloyd, Llewellyn F....Nannerch Hall, Mold
Lloyd, W. B...Preston, Montford Hall, Shrewsbury
Loader, J....Firgrove Farm, Whitchurch, Hants
†Lobb, Geo., Jun....Lawhitton, Launceston, Cornwall
†Locker, Wm. T....Tillington House, Stafford
†Locock, Sir C., Bt....Holmewood, Tunbridge Wells
†Locock, Edmund...South Elkington, Louth
†Locock, Fred....26, Hertford Street, May Fair
†Loesch, H....Cammerswaldau, Hirschberg, Prussia
Lofts, Jacob...Gt. Barton, Bury St. Edmund's
Logan, J...Maindee House, Newport, Monmouthsh.
Lombe, Rev. H. E....Milton Hall, Wymondham
†Londesborough, Lord...Grimston, Tadcaster
Long, Alexander Wearing...Mint Cottage, Kendal
Long, Daniel...Whaddon, Gloucester
†Long, Kellett...Dunstan Hall, Norwich
†Long, R. P., M.P...Dolforgan, Newtown, Montgom.
Long, Walter...Preshaw House, Bishop's Waltham
Long, W. Jervis...Preshaw Ho., Bishop's Waltham
†Longbourne, W. T...4, South Sq., Gray's Inn, W.C.
†Longcroft, C. J....Havant
Longcroft, C. R....Llanina, Aberayron, Cardigansh.
†Longe, John...Spixworth Park, Norwich
†Longford, Earl of...Packenham Hall, Westmeath
Longland, James...Grendon, Northampton
†Loomes, Edward...Whittlesea, Cambridgeshire
†Lopes, Sir Massey, Bart., M.P...Maristow, Roborough
Loraine, Edward...The Riding, Northumberland
Lord, Capt. John P....Hallow Park, Worcester
Lott, John...156, Victoria Park Road, N.E.
†Louch F. Wm. B....
Love, Peter...Northampton
Love, Samuel...Castle Farm, Shoreham, Sevenoaks
†Lovell, Edward W L....Dinder, Wells, Somerset
†Lovell, Edwin...Dinder, Wells, Somerset
†Lovell, Thomas...Winwick Warren, Rugby
Lowe, Edward...Comberford Mill, Tamworth
Lowe, John...Ryhall, Stamford
Lowe, John...Whitmore House, Birmingham
Lowe, John...Wheelock Heath, Sandbach
Lowe, Peter...Marston, Stafford
Lowe, Thomas...Calverley Hall, Handley, Chester
Lowe, Thomas Foster...South Croxton, Leicester
†Lowndes, Geo. Alan...Barrington Hall, Harlow
†Lowndes, W. L....Linley Hall, Bridgnorth, Salop
Lownds, J. R. ..Dene Ho., Walker, Newc.-on-Tyne
†Loyd, Lt.-Col. Ed....Lisden, Hawkhurst, Kent
†Loyd, Wm. Jones...Langleybury, Watford
Loye, Philip...Mannamead, Plymouth
Lucan, Earl of...36, South St., Park Lane, W.
†Lucas, Bernard...Chesterfield
Lucas, George...Filby House, Great Yarmouth
†Lucas, Lieut. Richard...Edith Weston, Stamford
Luckcock, Howard..Oak Hill, Edgbaston, Birmingh.
Luckham, Levi...Broadway, Weymouth
Lucy, Rev. J....Hampton Lucy, Stratford-on-Avon
Ludlow, H. G. G....Heywood House, Westbury
Ludolf, Henry...Headingley Lane, Leeds
Luff, John W....Canford, Wimborne
†Lugar, Henry...Hengrave, Bury St. Edmund's
Lumley, Robert...Black Hedley, Shotley Bridge
Lungley, Brooke M...Peyton Hall, Boxford, Suffolk
Lunn, Robert...Norton, Evesham
†Lupton, Arthur...Newton Hall, Leeds
Lurgan, Lord...Brownlow Ho., Lurgan, Armagh
†Lushington, C. Manners...
†Lutteroth, Robert...Hamburgh
Luttrell, Rev. Alex. H. F....Minehead, Taunton
†Lyall, William...
Lyell, Thomas...Shiehill, Kirriemuir, N.B.
Lyle, Joseph...Bonython, Helston, Cornwall
†Lyne, Robert L....Oddington, Stow-on-the-Wold
Lyne, Wm....Oddington, Stow-on-the-Wold
†Lynes, G. Boulton...Hackleton Ho., Northampton
Lynn, John...Church Farm, Stroxton, Grantham
Lyveden, Lord...Farming Woods, Thrapstone
Lywood, Edwin...Manor Ho., Maddington, Devizes

M.

Mabbett, John...Stinchcombe, Dursley, Gloucester
Mac Alpin, 17, Gallowtree Gate, Leicester
M'Cann, George...Court Farm, Malvern
†Macclesfield, Earl of...Sherburn Castle, Tetsworth

MacClintock, Maj. H. S...Randalstown, Antrim
†Macdonald, Sir A. K....Woolmer Lodge, Liphook
Macdonald, D. G. F., Bt....4, Spring Gardens, S.W.
MacDouall, Col. James...Logan, Stranraer, N.B.
MacDouall, James, jun....Logan, Stranraer, N.B.
†MacDowall, J. C. S....
Mace, J. Ellis...Ashford Road, Tenterden, Kent
McGeorge, John...Goudhurst, Staplehurst
†MacEwen, James...Clonshire, Croagh, Limerick
Macfarlan, Walter...Bretton Lodge, Wakefield
Machin, J. Vessey...Gateford Hall, Worksop
†MacIntosh, David...Havering, Romford, E.
Mackay, A. S. H....Charlton Ho., Wraxall, Bristol
†Mackenzie, E....Fawley Court, Henley-on-Thames
Mackenzie, William...34, Dawson Street, Dublin
Mackinder, Herbert...Mere Hall, Lincoln
†MacLagan, Peter, M.P...Pumpherstone, Midcalder
McLaren, Henry...Hylton Castle, Sunderland
McLaren, Wm....Gosforth, Newc.-on-Tyne
McLaughlin, W. G....Helmsley, York
Maclean, Allan, M.D....Colchester
†Macleod, Norman...
†MacNiven, Charles...Perrysfield, Oxted, Surrey
Macrae, Dr. A...The Priory, Kemerton, Tewkesb.
Madan, Martin...Haselour, Tamworth
†Maddison, George Wilson...Partney, Spilsby
Maddison, R. T....Wandon, Belford
Maddock, Henry...Sealand, Chester
Maddox, John...Harley, Much Wenlock
†Madgwick, Wm., jun....Alciston, Lewes
†Mahon, H. J. P...Strokestown House, Roscommon
Maidens, Thomas Cousins...Brinkhill, Spilsby
†Mainwaring, T., M.P....Galltfaenan, Denbigh
†Maitland, Col. F. T...Hollywych, Edenbridge
†Maitland, J. G....Surrey Villa, Lambeth, S.
Makgill, George...Prestbury, Cheltenham
†Malcolm, Maj.-Gen. G. A...67, Sloane Street, S.W.
†Malcolm, John...7, Great Stanhope Street, W.
Malcolm, M....Manor House, Kineton, Warwicksh.
Male, Henry...East Chinnock, Yeovil
Malloch, C. H....Court House, Cockington, Torquay
Mallows, W. J....Beyton, Bury St. Edmund's.
Malmesbury, Earl of...Heron Court, Christchurch
†Manchester, Duke of...Kimbolton Castle, Hunts
Manfield, W....Ixworth Thorpe, Bury St. Edmund's
†Mangles, F....Down Farm, Compton, Guildford
Mangles, George...Givendale Grange, Ripon
Mangles, Ross D....Stoke Park, Guildford
Manley, Major R. G....Kineton, Warwickshire
Mann, Henry...The Asps, Warwick
Mann, H...9, Woburn Buildgs., Euston Sq., N.W.
Mann, John...Thornage, Thetford
†Manners, Lord G., M.P...Cheveley Pk., Newmarket
Manning, Henry...251, High Holborn, W.C.
Manning, John...Orlingbury, Wellingborough
Mannings, George...Downton, Salisbury
Mannington, Wm....Laughton Place, Hurst Green
†Mannsfeld, Count...Dobrisch, Prag, Austria
Mansel, Raleigh A...Heathfield, Swansea
†Mansell, Sir John, Bart....Maesdeilo, Llandilo
Mansell, Thomas...Adcott Hall, Baschurch Salop
Maple, John...Bedford Lodge, Hampstead, N.W.
Mapplebeck, W. B....6, Bull Ring, Birmingham

†Margary, Maj. A. R....Chartham Pk., E. Grinstead
Margesson, Rev. W...28, St. Leonard's Ter. Chelsea
Margetson, James...Manor House, Shalden, Alton
†Margetts, Charles...Huntingdon
Margetts, John...High Street, Warwick
Marjoribanks, E...Greenlands, Henley-on-Thames
†Marjoribanks, D. C., M.P.,...Bushey Hall Farm
†Marjoribanks, Edward, jun....59, Strand, W.C.
Markby, John Randall...9, Whitehall Place, S.W.
†Markham, Charles, jun....Northampton
Markham, Lt.-Col. W. T...Becca Hall, Milford Junc.
Marks, Thos. Henry...Tiptree House, Kelvedon
Marmont, James...Bristol
Marriage, John...Grassmere, Mitcham, S.
Marriott, Capt. E. J. Beckett..Burford, Oxon
Marriott, John L....Narborough, Swaffham
†Marriott, W. M....Kibworth, Market Harborough.
Marris, Thomas...The Chase, Ulceby, Linc.
Marsh, John E....Alderton, Woodbridge
Marsh, John J....Hawkedon Hall, Clare, Suffolk
Marsh, Matthew H., M.P....Ramridge, Andover
Marsh, Richard...Sandwich, Kent
Marsh, Wm. Jas....Loridge, Berkeley, Gloucestersh.
†Marshall, Arthur...Headingley, Leeds
Marshall, Rev. C...9, South St., Finsbury Sq., E.C.
†Marshall, Edmond Henry...Westwood Hall, Leek
Marshall, Frederick Charles...Riseholme, Lincoln
†Marshall, George Hibbert...
Marshall, H. J....Poulton Priory, Cricklade
Marshall, James...Gainsborough
†Marshall, James Garth...Headingley, Leeds
Marshall, William...Bolney Place, Cuckfield
Marshall, William Francis...Branston, Lincoln
Marsham, Robert, D.C.L....Merton College, Oxford
Marten, Peter...Chilham, Canterbury
Martin, Chas. W., M.P....Leeds Castle, Maidstone
Martin, David...Wainfleet, Lincolnshire
Martin, E. Hall, jun....Barr Hill, Madeley, Staffs.
†Martin, E. Waterer...Nonsuch Park Farm, Ewell
†Martin, Fran. P. B...Oxford & Cambridge Cl., S.W.
†Martin, Gilson...Bedford Office, Tavistock
Martin, Henry B....Colston Basset, Bingham, Notts
†Martin, James...Wainfleet, Boston
Martin, Robert...Asterby, Horncastle
Martin, S. D....1, Park Place, Leeds
†Masfen, R. Hanbury...Pendeford, Wolverhampton
Mashiter, Thomas...Priest's, Romford, E.
†Mason, C. A...Tarrington, Ledbury, Herefordshire
†Mason, James...Eynsham Hall, Witney
Mason, Richard...Keddington, Louth
Massey, Samuel...Lawton Arms, Lawton, Cheshire
†Master, Charles H...Barrow Green House, Godstone
Master, Col. Thomas C....The Abbey, Cirencester
Master, Col. W. C...Knole Pk., Almondsbury, Bristol
Masterman, Thos. J....Little Danby, Northallerton
Masterman, T. W...The Hall, Rotherfield, Tun. Wells
†Matheson, Sir J., Bt., M.P...The Lewes Island, N.B.
Mathew, Edward Windus...Wern, Portmadoc
Mathew, William...Knettishall, Harling
Mathews, Augustus...Pitchcombe View, Stroud
†Mathews, Jeremiah...Edgbaston Ho., Birmingham
Matson, William...St. Osyth, Colchester
†Matson, W. Bawtree...Kentish Bldngs, Boro', S.E.

Matthews, Francis Cook...Driffield
Matthews, Henry...Montford, Shrewsbury
Matthews, John, M.D....Tynemouth
†Matthews, T....Newton by Castleacre, Brandon
Maud, Chas. T....Manor House, Bath
Maude, Col. G. A...Stud Fm., Hampton Ct., Midx.
†Maxse, Capt. F. A., R.N...Holly Hill, Southmptn.
Maxwell, Sir John H., Bt...Springkell, Ecclefechan
Maxwell, Hon. M. Constable...Terregles, Dumfries
†Maxwell, Wellwood...Munches, Dalbeattie, N.B.
May, Chas. Neale...Devizes (North Wilts Foundry)
May, George Anderson...Elford Park, Tamworth
May, John...London Road, Reading
May, Robert...Grendon Farm, Tavistock
Mayman, B....56, Drury Bldgs., Water St., Liverpl.
Maynard, Robert...Whittlesford, Cambridge
Meade, W. Rich....Ballymartle, Kinsale, co. Cork
Meakin, H. J....Shobnall Grange, Burton-on-Trent
Mechi, John J....112, Regent Street, W.
†Medlycott, Sir W. C., Bt...Milborne Port, Sherborne
Meeson, William Taylor...Doggetts, Rochford
Mein, William...Brewood, Stafford
Meir, H....Green Gates, Tunstall, Stoke-upon-Trent
Meire, Sam....Castle Hill, Harley, Much Wenlock
Meire, Thomas L....Eyton-on-Severn, Shrewsbury
Mellard, Ralph...Rugeley, Staffordshire
Mello, William...Chadwell, Ware
Mellows, William...High Melton, Doncaster
Melville, Hon. A. Leslie...Branston Hall, Lincoln
†Melville, Alex. S. Leslie..Branston Rectory, Linc.
†Melville, Charles Leslie...Branston Hall, Lincoln
Melvin, James...Bonnington, Ratho, Edinburgh
Mercer, F....28, Clayton St. West, Newc.-on-Tyne
†Mercer, James, M.D....
†Mercer, William...Newton, Warrington
Mercer, William...Grove Ho., Hunton, Staplehurst
Meredith, J...The Hildra, Halfway Ho., Shrewsbury
†Merriman, Thomas Baverstock...Marlborough
†Merriman, William Clark...Marlborough
Merson, James...South View House, North Molton
†Mertens, Baron Edward...Rue Ducale, Brussels
†Metcalfe, Charles James...
†Methley, Willoughby...24, Soho Square, W.C.
Methuen, Lord...Corsham Court, Chippenham
†Meyer, Herman P. D....Little Laver Hall, Ongar
†Meyer, James...Forty Hall, Enfield, N.
†Meyer, P. Hermn...Stondor Place, Brentwood
Meyrick, Owen Fuller...Bodergan, Anglesey, N.W.
Michell, John...Forcett Park, Darlington
†Micklethwait, Rev. J....Taverham Hall, Norwich
Middlebrough, J. R....South Milford, Milford Junc.
Middlemore, Mrs....Thorngrove, Worcester
†Middleton, Charles...Holkham
†Middleton, Henry...Cutteslowe, Oxford
Middleton, Saville...Water Newton, Hunts
†Midgley, W. H....Chelston Manor, Torquay
Milbank, A. S....Barningham Pk., Barnard Castle
†Mildmay, Sir H. St. J. Bt..Dogmersfield Pk., Winchfld
Mildmay, Humphrey...Shoreham, Sevenoaks
†Miles, Charles William...Burton Hill, Malmesbury
†Miles, Grosvenor...Bourton House, Rugby
†Miles, John William...King's Weston, Bristol
†Miles, P. W. S....61, Queen's Square, Bristol
Miles, Roger Dutton...Keyham, Leicester
Miles, Thomas...Keyham, Leicester
†Miles, William...Dix's Field, Exeter
Miles, William...De Montford Square, Leicester
Milford, Thomas...Thorverton, Cullompton
†Miller, Bartlett...Moulton, Northampton
Miller, George...Brantingham Hall, Brough
Miller, George...Gateshead
Miller, G. Seymour...Bradpole, Bridport
Miller, John...Walsham le Willows, Ixworth
Miller, Samuel...The Court, Abermule, Montgom.
Miller, Thomas...Hamsterley Hall, Gateshead
Mills, John...Bisterne, Ringwood
Mills, John...Pinkneys Green, Maidenhead
†Mills, J. R., M.P....Englefield Green, Surrey
†Mills, Joseph T....Husband's Bosworth, Rugby
Mills, R. W. F....Dunnington, York
†Mills, Wm....Saxham Hall, Bury St. Edmund's
Milne, David...Paxton House, Berwick
Milne, Oswald, jun....Woodville, Leamington
Milnes, James...Alton Manor, Wirksworth, Derbys.
Milvain, Ed. D...14, Elswick Villas, Newc.-on-Tyne
Milward, Dawson A....Tullogher, New Ross
Milward, Richard...Thurgarton Priory, Southwell
Minet, Charles Wm....41, West Smithfield, E.C.
Minett, J. E...Llowley Hall, Fillonghley, Coventry
Minor, A. H....Astley House, Shrewsbury
Minor, John...Pym's House, Wem, Salop
Minton, Alfred...The Lawn, Datchet, Bucks
Mitchell, Andrew...Alloa, Clackmannanshire, N.B.
†Mitchell, F. J...Llanfrechfa Grange, Newpt., Mon.
Mitchell, John...Wymondham, Norfolk
Mitchell, J. Hoffe...Witchampton, Wimborne
Mitchell, William...Northwold, Brandon
†Mitford, Wm. Townley, M.P....Pitshill, Petworth
Molyneux, James More...Losely Park, Guildford
Monck, J. Bligh...Coley Park, Reading
Monckton, E...Hale Place, East Peckham, Tonbridge
†Monckton, E. H. C...Fineshade Abbey, Northamp.
Monkhouse, Fred. Thos....
Monks, James...Aden Cottage, Durham
Monro, Mordaunt Martin...Enfield
Montgomery, Sir H., Bt...Burnham Grange, Mdenhd.
Montgomery, Rev. R...Holcot Rectory, Northampt.
Moody, General...Caynham House, Ludlow
†Moore, Rev. Edward...Frittenden, Staplehurst
Moore, Edward Wells...Coleshill, Faringdon
Moore, George...Appleby Hall, Atherstone
Moore, George...White Hall, Wigton
†Moore, Rev. G. Bridges...Tunstall, Sittingbourne
†Moore, Henry...Elmley Castle, Pershore
Moore, Henry...Calverton, Notts
Moore, James...11, Upper Berkeley St., Portman Sq.
Moore, John...Kerry, Montgomery
Moore, John...Church Street, Warwick
Moore, John...Moor House, Badsworth, Pontefract
Moore, John...Calverton, Notts
Moore, Joseph...7, Edith Terrace, West Brompton
†Moore, Thos. William...Warham, Wells, Norfolk
Moore, Wm....Elm, Wisbeach
Moorsom, C. R....Harewood, Leeds
Morant, George...Farnborough, Hants
Mordue, Francis...Wallsend, Newcastle-on-Tyne

More, R. Jasper, M.P....Bishop's Castle, Salop
†Morgan, Col. the Hon. F. C....Newport, Mon.
†Morgan, Maj. the Hon. G. C., M.P.... Cardiff
Morgan, M...Coppy Crooks, Bishop Auckland
Morgan, Roger...Llanellen, Abergavenny
Morison, Alex. John, M.D....Portcleu, Pembroke
Morland, George Bowes...Abingdon
Morland, W. Courtenay..Court Lodge, Lamberhurst
Morley, Earl of...Saltram, Plympton
Morley, John...Broughton Lodge, Manchester
Morley, Robert...
Morley, William...Haddon, Bampton, Faringdon
†Morrell, Frederick J....St. Giles's, Oxford
†Morrice, J. W....The Tower, Calthorpe, Rugby
Morris, Abiathar...Pendeford Ho., Wolverhampton
Morris, E. John....Stanley Pontlarge, Winchcombe
Morris, John...Town House, Madley, Hereford
Morris, Sir John...Wightwick Ho., Wolverhampton
†Morris, Col. Lewis G....Morrisania, New York
†Morris, Norman...The Warren, Edenbridge
Morris, Philip S....Whitwick, Ledbury
Morris, Richard...Knockin Heath Farm, Oswestry
†Morris, Thos., jun....Walcote Fields, Lutterworth
Morris, Thomas...Maisemore, Gloucester
Morris, Walter...Dewsal Court, Hereford
Morris, William, M.P....Carmarthen
Morris, Lieut.-Col. W. J...Tunbridge Wells
Morris, W. Rudkin...Silverlands, St. Leonard's
†Morrison, Charles...Basildon Park, Reading
†Morrison, Frank...Hole Park, Tenterden
†Morrison, Walter, M.P. ..Malham Tarn, Skipton
Morriss, N....Blue Ho., Washington Stat., Durham
Morshead, Sir Warwick, Bt... Forest Lodge, Binfield
Morton, Henry Thos....Biddick Hall, Fence Houses
Morton, John Chalmers...Harrow, N.W.
†Morton, J. D....18, Great George Street, S.W.
Moscrop, W. J....Aske, Richmond, Yorkshire
Mosley, Sir O., Bt...Rolleston Hall, Burton-on-Trent
Mosley, Tonman...East Lodge, Burton-on-Trent
Mostyn, Sir P., Bt....Talacre, Rhyl
†Mott, Charles John...Lichfield
Mott, Thomas...Much Hadham, Ware
Mott, William...Elmhurst, Lichfield
Moult, Wm....Knowsley, Prescot, Lancashire
Mount, Thomas...Saltwood, Hythe, Kent
Mount, William...Wasing Place, Reading
Mount Edgecumbe, Earl of...Mt Edgecumbe, Devonport
Mourant, Edward...Samare's Manor, Jersey
Mousley, Geo....Hooton Hall, Chester
†Mowbray, Capt. G. T....Overseal, Ashby-de-la-Zh.
†Moysey, H. G....Batheaton Court, Wiveliscombe
Mudford, Joseph...Hoe Fields, Hinckley
Mulkern, Edmond Cowell...Leighfields, Ockley
Mulliner, Job...Royton Farm, Wrexham
Mumford, George S....Lavenham, Sudbury
†Mumford, Maurice...Creeting, Stowmarket
Mumford, Richard...Chilton Park Farm, Thame
Mumford, William...Credenhill, Hereford
†Mumford, William Henry...
Mundy, C. J. Massingberd ...Ormsby Hall, Alford
Mundy, William...Markeaton, Derby
†Munn, Fred....Temple Langham, Worcester
†Munn, Maj. W. A....Churchill House, Dover
†Muntz, G. F....Umberslade Park, Birmingham
Murdoch, James Gordon...1, Pall Mall East, S.W.
†Murray, A....74, St. George's Rd, Belgravia, S.W.
Murray, Gilbert...Elvaston Castle, Derby
Murton, Frederick...Evegate, Smeeth, Ashford
Murton, Thomas...Kenninghall, Thetford
Murton, William...Tunstall, Sittingbourne
†Musgrave, Sir Geo., Bart....Edenhall, Penrith
Musgrave, Rev. Vernon...Hascombe, Godalming
Muskett, Chas....Bressingham House, Diss
Muspratt, S., M.D...Royal Coll. Chemistry, Liverpo.
†Musters, John C....Annesley Park, Linby, Notts
†Mynors, R...Weather Oak, Alvechurch, Bromsg...
Mynors, W. C. T....Elford Lowe, Tamworth
Myott, James...Capesthorne, Congleton
Mytton, Thos...Shipton Hall, Much Wenlock

N.

†Nainby, Charles M...Barnoldby le Beck, Grimsb.
†Naish, W. B....Stoneaston, Bath
Nalder, Thomas...Challow, Wantage
Naper, Jas. L., jun....Loughcrew, Oldcastle, Irel.
†Napier, Edw. B....Pennard House, Shepton M...
Napier, Hon. William...3, Parliament Street, S.W.
Napper, John...Ifold, Horsham
Nash, Charles...Royston, Herts
Nash, Daniel...4, York Gate, Regent's Park, N.W.
Nash, John...The Rectory, Langley, Slough
Nash, Henry F....Upton Lea, Slough
Nash, Thomas...Carlton Grange, Newmarket
Nash, William,..St. Austell
†Nathusius, Baron G...Hundisburg, Prussia
†Naylor, John...Liverpool
†Naylor, Rich. Christopher...Hooton Hall, Che...
Neale, Charles...Mansfield Woodhouse, Notts
Neale, Charles.....New Field House, Screveton
Neale, Charles James...Mansfield, Notts
Neame, Charles...Woodlands, Selling, Faversham
†Neame, Edward...Selling Court, Faversham
Neame, Frederick...Macknade, Faversham
†Neame, H. B....Selling Court, Faversham
Neame, P. B....The Mount, Ospringe, Faversham
Neame, Robert...Boughton Blean, Faversham
Neave, Sheffield...Oakhill House, Hampstead, N.W.
†Negus, Thomas A....Lynn House, Walsall
Neild, Henry...The Grange, Worsley, Manchester
Neilson, Thomas...Regent Terrace, Gateshead
Nelmes, William...Pembridge Castle, Monmouth
Nesfield, R. M. N....Castle Hill, Bakewell
Nesham, David...Houghton-le-Skerne, Darlington
Nethercote, H. O....Moulton Grange, Northampt.
Neve, C....Amberfield, Chart Sutton, Staplehurst
Neve, George...Sissinghurst, Staplehurst
Nevett, Wm...Yorton, Harmer Hill, Salop
†Nevile, Rev. Christopher..Thorney, Newark, N...
†Nevile, George...Shebton, Newark-on-Trent
†Nevill, Viscount...Hope Hall, Tadcaster
Neville, John, jun....Mathon Lodge Farm, Malve...
New, David...Waverley House, Nottingham
New, Richard E ...Hartpury, Gloucester

†Newbery, R. P....Webble House, Chard, Somerset
Newcombe, Samuel...White Crofts, Orsett, Essex
Newdegate, C. N., M.P....Arbury, Nuneaton
†Newdigate, Col....Byrkley Lodge, Burton-on-Tt.
Newill, Joseph...Walcot, Lydbury, Shropshire
Newill, Thos...Spring Bank, Welshpool
†Newman, J....Brands Ho., High Wycombe, Bucks
Newman, Thomas...Cray's Marsh Farm, Melksham
Newton, Chas. Ed...Mickleover, Derby
†Newton, G. Onslow....Croxted Park, St. Neot's
Newton, Martin...Oldfield, Altrincham
†Newton, R. J....Campsfield, Woodstock
†Newton, Thomas...
Newton, T. H. G...Clopton Ho., Stratford-on-Avon
Nicholay, J. A....Cumberland Mills, Isle of Dogs, E.
Nicholls, John S....Buckland, Lymington
Nicholls, Wm....Chippenham
Nichols, Ben....West End Farm, Aldershot
Nicholson, B...Sturton Grange, Garforth, Leeds
Nicholson, Geo....Winlaton, Blaydon-on-Tyne
†Nicholson, James ..Blencairn Hall, Penrith
Nicholson, J....Kirkby Thore Hall, Westmoreland
Nicholson, Capt. S....Waverley Abbey, Farnham
†Nicholson, William...4, Sussex-square, W.
Nicholson, Wm. Newzam...Newark-upon-Trent
Nickisson, John...The Brooms, Stone, Staffs.
Nicol, James D., M.P...13, Hyde-Park Terrace, W.
†Nightingale, Vaughan E....Burway, Ludlow
†Nightingale, W. E....Embley, Romsey
Nisbet, Ralph Pattison...Thorney, Peterborough
Nixey, W. G....Upton Court Farm, Slough
†Noakes, John Tompsett..Brockley Ho., Lewisham
Nock, Thomas....Sutton Maddock, Shiffnal
Nock, T. F....Kingslow, Bridgnorth
Nodder, Rev. J....Marsh Green, Chesterfield
Noon, Charles...The Laurels, Stoneygate, Leicester
Norfolk Richard...Iron Works, Beverley
†Norman, George Warde...Bromley, Kent, S.E.
†Norman, J. Newcomb...Harborough Magna, Rugby
†Normanby, Marquis of,..Mulgrave Castle, Whitby
Norreys, Robt. H....Davy Hulme Hall, Manchester
†Norreys, Viscount...Wytham Park, Oxford
Norrington, Charles...Cattedown, Plymouth
Norrington, Joseph...North Hill Villa, Plymouth
Norris, Rev. G. P....Roscraddoc House, Liskeard
†Norris, Wm....Wood Norton, Fakenham
North, Chas....South Thoresby, Alford, Lincolnsh.
North, Frederick...Rougham, Norfolk
North, Lieut.-Col., M.P...Wroxton Abbey, Banbury
†Northcote, Rt. Hon. Sir S. H., Bt...Pynes, Exeter
Northey, Edward Richard...Epsom
Northey, Wm....Lake, Lifton, Devon
†Northumberland, Duke of,...Alnwick Castle
†Nott, James...Penn Hall, Eardiston, Tenbury
†Nottidge, Josias...Ramsgate
Nowell, W. A...Netherside, Skipton, Yorkshire
Noyes, Thomas H....13, Gate Street, Lincoln's Inn
Nunn, Edmund B....Royston, Cambs.
Nunn, Fred....Westgate Street, Bury St. Edmund's
Nunn, G. H....Eldo House, Bury St. Edmund's
Nunn, John...Fornham, Bury St. Edmund's
Nunnerley, T...Bradley Green, Whitchurch, Salop
Nuttall, Thomas...Manor House, Beeby, Leicester

O.

Oakes, Hervey Asten...Hill House, Stowmarket
Oakes, Thos. Haden...Riddings House, Alfreton
Oakley, Christopher...10, Waterloo Place, S.W.
†Oakley, George...Greenhurst Park, Godstone
Oakley, James...Woodborough, Nottingham
Oakley, John...10, Waterloo Place, S.W.
Oakley, Richard...Lawrence End, Luton
Oastler, Jonah...White's Farm, Alfold, Horsham
†Ockleston, Wm. Fairhurst...Cheadle, Manchester
Odames, S....Watling St., Leicester
Odams, James...109, Fenchurch Street, E.C.
†Ogden, John Maude...Sunderland
†Ogilvie, Alexander...Sizewell House, Leiston
Ogilvy, Sir J., Bt., M.P....Baldovan Ho., Dundee, N.B.
Oldacres, Matthew...Clipston, Market Harborough
Oldacres, Walter...Broad Fields, Lichfield
Oldfield, Edmund...Fouldon Hall, Brandon
Oldham, John...Carlton-on-Trent
Olding, Edmund...Ratfin Farm, Amesbury
Oldrin, John...Rushmere, Wangford, Suffolk
Oliver, George J...Risby Gate, Bury St. Edmund's
Oliver, James...Hanford, Blandford
†Oliver, John...Oxendon, Northampton
Oliver, Robert E....Sholbrooke Lodge, Towcester
Oliver, Robert J....Docking, Lynn, Norfolk
Olver, Richard Sobey...Trescowe, Bodmin
Onslow, Arthur P....Send Grove, Woking Station
Orbell, William...Hawstead, Suffolk
Ord, George...Brixton Hill, S.W.
Ord, James...Cloth Market, Newcastle-on-Tyne
Ord, J. T....Fornham House, Bury St. Edmund's
Ord, Rev. J. A. B....Whitfield Hall, Haydon Bridge
Orde, Charles William...Nunnykirk, Morpeth
†Orde, Sir J. P. W., Bt...Kilmorey Ho., Loch Gilp Head
Orlebar, R. L....Hinwicke House, Wellingborough
Ormerod, George...Sedbury Park, Chepstow
Ormerod, Henry Mere...5, Clarence St., Manchester
Ormond, Francis...Moulton Park, Northampton
Ormston, Robert...Newcastle-on-Tyne
†Osborn, G., jun....Manor Ho., Pattishall, Towcester
Osborn, Henry...Weeford Park, Hints, Tamworth
Ostler, John, jun....Walrond Park, Taunton
†Otrante, Count A....Nygard, Söderköping, Sweden
†Overman, Henry R....Weasenham, Fakenham
†Overman, John...Burnham, Sutton, Norfolk
†Overman, Robert...Egmere, Walsingham, Norfolk
Overton, R., Junr....De Montford Sq., Leicester
Owen, William...Blessington, Ireland
Owen, William...Moorgate Hall, Rotherham
Owen, William...Withybush, Haverfordwest
Owens, Samuel...Whitefriars Street, E.C.
Owsley, Wm. P. Mason...Blaston, Uppingham
Owston, Hiram A....Great Wigston, Leicester
Oxford, Bishop of...Cuddesden, Wheatley, Oxon

P.

Pack, Thomas Henry...Ditton, Maidstone
†Packard, Edward...Ipswich
†Packe, Geo. H., M.P....Caythorpe Hall, Grantham

†Packe, Dr. James...Melton Lodge, Woodbridge
Padmore, Richard, M.P....Worcester
Padwick, Fred....West Thorney, Emsworth, Hants
Page, Bridgewater...West Cliff, Southampton
Page, Edward...Bedford
†Page, Henry...Walmer Court, Walmer
Page, William, jun....Southminster, Maldon
Paget, Charles...Ruddington Grange, Nottingham
Paget, E. Arthur...Thorpe, Leicester
†Paget, Col. L. G....Park Homer, Wimborne
Paget, Lewis...Quenibro', Leicester
†Paget, T. Tertius, M.P..Humberstone, Leicestersh.
Pain, John...Popham, Micheldever Station
Pain, T...Ugford Cottage, Salisbury
Paine, G. J....Risby, Bury St. Edmund's
†Paine, Mrs....Farnham, Surrey
Paine, John D....Risby, Bury St. Edmund's
Paine, William D...Chevington, Bury St. Edmund's
†Paine, Wm. Dunkley...Cockshutt Hill, Reigate
Painter, Benjamin...Burley-on-Hill, Oakham
Painter, John...Forest Road, Nottingham
Painter, Robert...18, Gallowtree Gate, Leicester
Painter, Thomas...Bodlondeb, Wrexham
Paitson, William...Irish Street, Whitehaven
Pakington, Rt. Hon. Sir John, Bt., M.P...Droitwich
†Palin, William...Stapleford Hall, Chester
Palmer, C. M....Whitley Park, Newcastle-on-Tyne
Palmer, George...Greenwood, Bishop's Waltham
Palmer, George...Hawstead, Bury St. Edmund's
Palmer, Leonard J....Snetterton, Thetford
†Palmer, Rev. P. H...Wolsthorp Rectory, Grantham
Palmer, Robert...Bexington, Bridport
Palmer, W. O....Bradfield, Bury St. Edmund's
†Papillon, P. O...Manor House, Lexden, Colchester
Papillon, Thomas...Crowhurst Park, Battle
Paramore, J. Rawle...Dinedor Court, Hereford
Parker, Charles L....Ilderton, Alnwick
†Parker, Charles Stuart...Annesley, Liverpool
Parker, Rev. Henry...Ilderton Rectory, Alnwick
Parker, Henry...Low Elswick, Newcastle-on-Tyne
Parker, John O....Drinkstone, Woolpit
Parker, Rowland...Moss End, Burton, Westmoreld.
Parker, Thomas James...10, George St., Sheffield
Parker, T. Sumner...Oxton, Southwell
†Parker, Wm....Carlton Hill, Penrith
Parker, William...The Park, Ware
Parker, Rev. W...Rectory, Little Comberton, Pershore
Parker, Maj. W., M.P....Clopton Hall, Woolpit
Parkes, Thomas... Grafton Manor, Bromsgrove
Parkin, John...Idridgehay, Wirksworth
†Parkinson, John....
†Parkinson, R...Oak House, Northenden, Manchest.
†Parkinson, Thomas...Hexgreave Park, Southwell
†Parkyns, Sir Thos. G. A., Bt....Ruddington, Notts.
Parlby, J. Hall, Rev....Manadon, Plymouth
Parnell, Wm...21, Collingwood St., Newcastle-on-T.
Parr, George Junr....Chapel Street, Manchester
Parr, Herman...Barton, Nottingham
Parr, Samuel...The Poultry, Nottingham
Parrington, John...Brancepeth, Durham
†Parris, John W....Farnham, Bishop's Stortford
Parrish, Richard...Uplands Farm, Bridgnorth
Parrott, Edward...Shirburn, Tetsworth
Parrott, John Junr....Norfolk Farm, Staines
Parrott, Thos....Green Bank, Sutton, Macclesfield
Parry, Edward Powell...Morfodion, Llanidloes
†Parry, Joseph...Allington, Devizes
Parry, Nicholas...Little Hadham, Ware
Parson, Wm....Rivers Hall, Boxted, Colchester
Parson, Rev. W. H...Lynchmere Rectory, Haslemer
Parsons, Chris., jun...North Shoebury Hall, Rochfor
Parsons, Charles William...Anstrey, Atherstone
†Parsons, Geo....Martock, Somerset
†Parsons, Henry...Haselbury, Crewkerne
Parsons, John...Oxford
Partridge, Charles...Clyro House, Hay
Partridge, John...Bishop's Wood, Ross
Pashley, Alexander William...Tivetshall, Scole
†Paterson, Richard...Leesons, Chiselhurst
†Pateshall, Evan...Hereford
†Patmore, James...Hockerhill, Bishop's Stortford
Pattenson, Capt. W. H. Tylden. Ibornden, Biddende
Patterson, Henry...Normanton Hill, Loughboro'-
Patterson, John...Hall Beck, Ulverston
Paull, Wm. Joseph...Piddletown, Dorcheste,
Paver, William...Peckfield, Milford Junction
Pawlett, Thos. Edward...Beeston, Sandy, Beds
Paxman, James...Bank Buildings, Colchester
Paxton, Robert...Lower Winchenden, Aylesbury
Payne, George...Badwell Ash, Ixworth
Payne, Henry...Birdbrook, Halstead, Essex
Payne, William...Willcott, Nesscliff, Salop
Peacey, William...Chedglow, Tetbury
Peachey, Wm....Ebernoe, Petworth
†Peacocke, Warren...Efford, Lymington
Peacocke, Wilkinson...Greatford Hall, Stamford
Pead, William...Crown Street, Bury St. Edmund's
Pears, William...Fenham Hall, Newcastle-on-Tyne
†Pearse, Henry...32, Queen's Gate Terrace, W.
Pearson, Capt. Wm....North Kilworth, Rugby
†Pease, J. Whitwell, M.P....Woodlands, Darlingto
†Peck, Edmund...Plas-y-Dinas, Shrewsbury
Peel, Edmund...Bryn-y-Pys, Wrexham
Peel, George...Brookfield, Cheadle, Manchester
Peel, John, M.P....Middleton Hall, Tamworth
†Peel, Jonathan...Knowlmere Manor, Clitheroe
Peel, Rt. Hon. Sir R., Bt. M.P.. Drayton Manor, Fazele
Peel, Wm....Taliaris Pk., Llandilo, Carmarthenshi
Peel, William...Trenant Park, Liskeard
Peel, Xavier de C. Royds...Denant, Haverfordwes
Peers, Joseph...Ruthin
†Peile, Thos. Williamson...Lichfield
Pelham, Francis...Cound Hall, Shrewsbury
†Pell, Albert...Hazelbeach, Northampton
†Pell, Sir Watkin O....Royal Hospital, Greenwich
Pelly, Capt. Rich. Wilson...New Place, Upminster
†Pemberton, Rev. R. N....Church Stretton, Salop
†Penn, Granville J....
†Pennant, P. Pennant...Brynbella, St. Asaph
Pennell, H. B....Dawlish
Pennington, Frederick.. Broome Hall, Dorking
Pennington, Richard...Westfield House, Rugby
Penny, Thomas...Taunton
Penrice, Thomas...Kilvrough, Swansea
Pepper, John...22, Wellington Street, Leeds
Pepper, William...Clarendon Mount, Leeds

†Peppercorn, J. Hutchinson..Eaton Socon, St. Neot's
Peppercorne, H....Bradburn Park, East Malling
†Perales, Marquis de...Madrid
†Perceval, Chas....West Haddon, Northamptonshire
Peren, W. B....Compton, South Petherton, Somerset
Perkins, Charles...The Grange, Kingston, Taunton
†Perkins, Henry...Thriplow, Royston
Perkins, Jos., jn...Laughton, Theddingworth, Rugby
†Perkins, Thomas...Hitchin
Perkins, Walter...Bowling Green Ho., Southampton
†Perry, Thos. A...Betham Ho., Avon Dasset, Banbury
Perry, Sir T. Erskine, Bt...West Court, Wokingham
Perry, Wm....Alder Lewdown, Exeter
†Perry-Watlington, J. W....Moor Hall, Harlow
Pertwee, James...Boreham, Chelmsford
Peter, John Lake...Redruth
Peters, Daniel...31, College Green, Bristol
†Peto, Sir S. Morton, Bt....9, Gt. George St., S.W.
Petre, Edward...Whitley Abbey, Coventry
Pettitt, E....18, St. John St., Bury St. Edmund's
Phelips, Charles...Briggins Park, Ware
†Philips, Sir G. Richard, Bart....Shipston-on-Stour
Philips, Mark...Snitterfield, Stratford-on-Avon
Phillimore, Edward...Cheltenham
Phillimore, Rev. G....Radnage, Stokenchurch, Oxon
Phillipps, James...Bryngwyn, Ross, Herefordshire
Phillips, Henry R....Willesden Paddocks, Kilburn
†Phillips, J. H....Bendlam Grange, Newton, York
Phillips, J. R. S....Riffhams Lodge, Danbury
Phillips, Joseph Taylor...Sheriff Hales Manor, Salop
Phillips, Richard...Brockton Grange, Shiffnal
Phillips, Sir Thos., Knt....Llanellan, Abergavenny
Phillips, Maj.-Gen. Sir T., Knt...Sen. U. S. Cl., S.W.
Phillips, Thomas E....37, Wilton Place, S.W.
†Phillpotts, T., jun....Norfolk Villa, Eastbourne
†Phipps, Charles Paul...Chalcot House, Westbury
Phipps, Filmer...River, Dover
Phipps, Hon. & Rev. A...Euston Rectory, Thetford
†Phipps, John Lewis...Leighton, Westbury, Wilts
Phipps, Thomas...Bricklehampton, Pershore
Pickering, Leonard...Wilcot, Charlbury, Oxon
†Pickford, William...148½, Fenchurch Street, E.C.
†Piercy, Alfred...Cold Harbour, Henley, Oxon
Piercy, Rev. John M. W....Slawston Vicarage
†Pierson, Jas. Alex....The Guynd, Arbroath, N.B.
Piggot, Jas. Algernon...Beckingham Hall, Witham
†Piggott, Geo. Grenville...Doddershall, Winslow
Pigot, Sir Robert, Bart....Patshull, Wolverhampton
Pike, John...Bolland, West Anthony, Torpoint
Pike, William...Castle Thorpe, Stony Stratford
Pilcher, Jesse...Cheriton Court, Hythe, Kent
Pilgrim, Charles H....
Pilgrim, S. C....The Outwoods, Hinckley
†Pilkington, Sir L. M. S., Bt...Chevet Pk., Wakefield
Pinckard, George H....Combe Court, Godalming
Pinder, Thomas...Barrowby, Grantham
†Pinnegar, C....Rockbourn, Fordingbridge, Hants
Pinney, Col. W....Somerton-Erleigh, Somersetshire
†Pipon, Capt. M....Deerswood, Crawley
Pippet, William...Coughton House, Redditch
Pitfield, A. J...Eype, Symondsbury, Bridport
Pitfield, John...Symondsbury, Bridport
Pitt, George...Chadnor Court, Dilwyn, Leominster
Pitt, Walter William...Whitchurch, Monmouth
Plant, Edward...Little Onn, Stafford
Plant, Henry W. C....Burley Fields, Stafford
Plant, Thomas...Elworth Hall, Sandbach, Cheshire
Platt, Henry...Werneth Park, Oldham, Lancashire
Platt, James...Newton, Malpas
Plowden, W....Plowden Hall, Bishop's Castle, Salop
Plumptre, Charles J....Fredville House, Sandwich
Plumptre, J. B....Goodnestone Farm, Wingham
Pochin, Capt. R. J., R.N..Barkby Ho., Leicester
†Pocock, Chas....
Pocock, George...New London Road, St. Alban's
Pogson, S. M....Anwick, Sleaford, Linc.
Pole-Gell, H. Chandos...Footherley Hall, Lichfield
Pole, Sir Van Notten P., Bt...70, Kensgn. Gds. Sq., W.
Pole, Rev. Reginald Chandos...Radbourne, Derby
Pollard, George...Trafford Hill, Yarm, Yorkshire
Pollard, J. G....1, Marion Villa, North Rd., Forest Hill
†Pollard, Joseph....Highdown, Hitchin
Pollard, Joseph..12, Ellison Pl., Newcastle-on-Tyne
†Pollen, R. H....Rodbourne, Chippenham
Pollock, George D....27, Grosvenor Street, W.
Pollock, J. O. G...Mountain's Town, Navan, Ireland
†Pomfret, Virgil...Tenterden, Kent
Pooly, Thomas...Northwold, Brandon
Pope, John...Symondsbury, Bridport
Pope, Thomas...Harewood, Bletchingly, Surrey
Pope, William...The Wharf, Biggleswade
Porter, James...Corney Bury, Buntingford
Porter, J. T. B....Lincoln
Porter, Lieut.-Gen....Minterne House, Dorchester
Porter, Thos....Baunton, Cirencester
Porter, Timothy...Swinford, Rugby
Porter, Wm....Hembury Fort, Honiton
†Portman, Hon. W. H. B., M.P...Bryanston, Blandf.
†Portsmouth, Earl of...Eggesford Ho., North Devon
Potter, T. B., M.P....Buile Hill, Manchester
Potterton, W. H....Boughton Grange, Northmptn.
Potts, Bainbriggs...Calverton, Notts
Potts, John D....Woodboro', Nottingham
Powell, Evan....Newtown, Montgomeryshire
Powell, John Thomas...Easton, Pewsey, Wilts
Powell, Richard...The Hall, Benson, Wallingford
†Powell, Rev. S. H...Sharow Hall, Ripon
†Powell, Thomas...Coldra, Newport, Monmouthshire
†Powell, Thos. H...Drinkstone Pk., Woolpit, Suffolk
Powell, Wm...Eglwys Nunydd, Taibach, Glamorg.
†Power, K. Manley...Hill Court, Ross, Herefordshire
Powis, Benjamin...Newnham, Tenbury
†Poynder, T. H. A....Hartham Park, Corsham
Poyser, Josiah T....Burton-on-Trent
Prance, Courtenay Connell...The Elms, Evesham
Pratt, Edward...Caldwell, Burton-on-Trent
Pratt, Rich. Fred....Highfield, Sedlescomb, Battle
Pratt, W. P....Stradishall, Newmarket
†Prentice, Manning...Stowmarket
Preston, Benjamin B....Rutland Street, Leicester
Preston, James...Highfield Villa, Leicester
†Preston, Capt. J. N...Flasby Hl., Gargrave-in-Craven
Preston, Thomas...Scosthrop Ho., Bellbusk, Leeds
Preston, William...Rutland Street, Leicester
Preston, Thomas H....Moreby Hall, York
Pretty, William...Palgrave, Diss

†Pretyman, Arthur...Camp Hill, Nuneaton
Price, Charles...Quenington, Fairford
Price, James...Eye Cottage, Leominster
Price, Richard G., M.P....Norton Manor, Presteign
Price, William...Glan Twrch, Swansea Valley
Price, Wm. Philip, M.P....Tiberton Ct., Gloucester
Prickard, Thos....Dderw, Rhayader
Priday, Samuel...Linton, Gloucester
Prideaux, Sir Edm. S., Bart....Netherton, Honiton
Priest, Alfred...Kingston-on-Thames, S.W.
Priestley, J....Hirdrefaig, Llangifai, Isle of Anglesea
Priestley, S. O....Trefan, Pwllheli, Caernarvonshire
Princep, William...Newton, Tamworth
†Pritchard, John, M.P....Broseley, Salop
Pritchard, Robt....Llwydiarth Esgob, Bangor
Pritchard, Wm...Roy. Vet. Coll., Camden Town, N.W.
†Probyn, Edmund...Huntley, Gloucestershire
Proctor, Thomas...Elmdale House, Clifton, Bristol
†Prodgers, Herbert...Kington House, Chippenham
Pronger, James...Mill Farm, Beeding, Horsham
Prosser, B...Offerton Farm, Hindlip, Worcester
†Prosser, Francis Wegg...Belmont, Hereford
Prosser, John...Honeybourne Gardens, Gloucester
Prosser, T....Sandfield Villa, West Boldon, Durham
Prout, John...Sawbridgeworth, Herts
Pryke, John P....Aldersfield Hall, Wickhambrook
Pryor, Morris...Baldock, Herts
Pryse, Colonel, M.P....Peithill, Aberystwyth
Pryse, John Pugh..Bwlchbychan, Llanbyth, S. Wales
†Pryse, Sir Pryse, Bt....Gogerddan, Shrewsbury
Puckle, T. Broadhurst...Woodcote Grove, Carshalton
Pugh, Robert...Llwyndû Llwyngwril, Dolgelly
†Pugh, William...Coal Port, Ironbridge, Salop
Pugh, William...Woburn Road, Croydon, S.
†Pulleine, James...Clifton Castle, Bedale
Pullen, Richard...Shackerley House, Albrighton
Pulley, Joseph...Lower Eaton, Herefordshire
Pulley, Joseph, jun....Lower Eaton, Herefordshire
Pullin, James...Wraysbury, Staines
Pullin, Stephen...Mildridge Farm, Horton, Slough
Pulteney, J. G. B....Lyndhurst
†Punnett, P. Simpson...Chart Sutton, Staplehurst
Purrott, Charles...8, Park Street, Croydon, S.
Pursell, Samuel...Oxley, Wolverhampton
Purser, Edward...116, Fenchurch Street, E.C.
Purton, C. C....The Woodhouse, Cleobury-Mortimer
Purves, Peter...The Grove, Brampton, Huntingdon
†Pusey, S. E. B. Bouverie...Pusey Ho., Faringdon
Pyatt, Abraham...Wilford, Nottingham
†Pye, Geo....Cublington, Madley, Herefordshire
Pye, Henry Abington...Louth

Q.

Quartly, Jas....Molland House, South Molton
Quartly, John...Champson Molland, South Molton
Quenby-Ashby, Rev. E....Quenby Hall, Leicester
Quibell, William Oliver...Newark-on-Trent
Quinn, P., J.P....Agency, Newry, Ireland

R.

Racster, William...Withington Court, Hereford
†Radcliffe, C. Lopes...Derriford, Tamerton Folio
Radford, H. B....Stanton Ho., Burton-on-Trent
Radford, William...Thulston, Derby
Raglan, Lord...Cefntilla Ho., Usk, Monmouthshire
Railton, Henry...Snittlegarth, Wigton
†Raincock, H. D....Waltons, Linton, Cambs.
Rainforth, Edward...Monkhopton, Bridgnorth
Ralph, R. W....Honnington Grange, Newport, Salop
Ralphs, John...Saighton, Chester
Ralston, James...Danesfield, Great Marlow
Rammell, Wm. L....Sturry Court, Canterbury
Ramsay, D. R....Willington, Newcastle-on-Tyne
Ramsay, G. H....Derwent Villa, Newcastle-on-T.
Ramsay, Thomas...Sherburn Green, Gateshead
Ramsbotham, J...Crowborough Warren, Tunb. Wells
†Ramsden, John C....Busbridge Hall, Godalming
Ramsey, John...9, Endsleigh Street, W.C.
Rand, William...Saffron Walden
Randall, Alexander...Maidstone
Randall, R. G....Winfrith, Dorchester, Dorset
Randell, Charles...Chadbury, Evesham
Randell, James R....Chadbury, Evesham
Randle, Thomas...Ombersley, Droitwich
Randolph, Admiral C. G....Gt. Comp, Sevenoaks
Randolph, Lt.-Col. C. W....76, Chester Sq., S. W.
Rands, G....Ipswich
Rands, Josiah...Ipswich
Rands, William...Ipswich
Ranford, C..12, New Weston St., Bermondsey, S.E.
Ranger, Josiah...Ashdown Park, East Grinstead
Ranken, W. B....Abbott's Langley House, Herts
Ransome, James Allen...Ipswich
Ransome, J. E....Bolton Hill, Ipswich
Ransome, R. C....Bolton Hill, Ipswich
Ratcliff, R....Standard Hill, Ninfield, Battle
Ratcliff, Thos....Norton House, Sheepy, Atherstone
Ratleff, William...Newmarket
Raven, John...St. Helens, Maryport
Ravenshaw, James...Bridleway Gate, Shrewsbury
Ravensworth, Ld....Ravensworth Castle, Gateshead
Rawes, John...Upper Dicconson Street, Wigan
Rawlence, James...Bulbridge, Wilton, Salisbury
Rawlinson, Robt...Sella Park, Whitehaven
†Ray, Samuel...Grove Ho., Gt. Yeldham, Halstead
Rayer, Wm. Carew...Holcombe Court, Wellington
†Raynbird, Hugh...Church Street, Basingstoke
Raynbird, Robert...Hengrave, Bury St. Edmunds
Raynbird, William...Hengrave, Bury St. Edmunds
Rayne, Septimus William...Newcastle-on-Tyne
Rayner, Henry...Smethwick, Birmingham
Rea, Charles...Doddington, Wooler, Northumb.
†Read, Clare S., M.P...Honingham Thorpe, Norwich
†Read, Geo., jun....Barton Hall, Brandon, Norfolk
Read, Henry...London Road, Beccles
Reading, William...Ashorne, Leamington
Reay, Matthew...Heworth Lane, Gateshead
Reay, Robert...Berwick Hill, Newcastle-on-Tyne
Reed, Howard..'Herald' Office, Sydney, N. S. Wales

Reek, Edward...Nuttall, Nottingham
Rees, William...Penywaun, Glamorganshire
Rees, W. Treharne...Holly House, Newport, Mon.
Reeve, James...Snetterton Hall, Thetford
Reeve, W. Napier...Leicester
Reeves, J. R....Hantsland, Crawley Down, Sussex
Reeves, Robert...Bratton, Westbury
Relph, G. R. Greenhow...Beech Hill, Usk
Rendle, Robert...Catel Farm, Guernsey
Rendle, William Edgcumbe...68, Welbeck St., W.
Reynardson, Henry Birch...Adwell, Tetsworth
Reynolds, Joseph Benj....Lubbesthorpe, Leicester
†Reynolds, Dr. William...The Cloisters, Liverpool
Rhodes, Arthur..Twyford House, Bishop's Stortford
Rhodes, J. Armitage...Carlton, Pontefract
†Ricards, Mortimer...Bure Homage, Christchurch
Rice, Edward Royd...Dane Court, Wingham
Rich, Stiles...Didmarton, Chippenham
†Richards, Edward Priest...Cardiff
†Richards, John...Llyncleys, Oswestry
Richards, William...Belgrave, Leicester
†Richardson, E., jun..Chem. Wks., Blaydon-on-Tyne
Richardson, Francis E...Brumshall, Uttoxeter
Richardson, G....Bridlington Quay, Yorkshire
Richardson, Henry...Cherry Hill, York
Richardson, James...104, Percy St., Newcastle-on-T.
Richardson, John...Asgarby, Spilsby
Richardson, J. G. F....Knighton, Leicester
Richardson, Sir J. S., Bt....Pitfour Castle, Perth, N.B.
Richardson, Jonathan..Glenmore, Lisburn, Antrim
Richardson, Richard...Halewood, Liverpool
†Richardson, Robert...
Richardson, Capt. Thos....Sutton Hurst, Barcombe
Richardson, T. M....Hibaldstow Grange, Kirton
†Richmond, Duke of, K.G....Goodwood, Chichester
Richmond, Francis...Salford, Manchester
Richmond, William...62, South John St., Liverpool
Rickard, William Martyn...Devonport
†Ricketts, James...Westbury-on-Severn
Riddell, E....Cheeseburn Grange, Newcastle-on-Ty.
†Riddell, Henry Buchanan..The Palace, Maidstone
Riddell, John...St. Ninian's, Wooler, Northumb.
Riddell, T....The Park, Felton, Northumberland
†Riddell, Sir W. B., Bt...Hepple Rothbury, Morpeth
Rider, Thos. John...Kenwick, Shrewsbury
Ridge, T. J....Hambledon, Horndean, Hampshire
Ridgway, Capt. Alex....Blackanton, Totnes
Ridgway, John...Fairlawn, Wrotham, Kent
†Ridgway, J....Cauldon Pl., Shelton, Stoke-on-Trent
Ridgway, Thomas...Lymm, Warrington
†Ridler, Richard H....Gatterlop, Leominster
Ridley, J. M....Walwick Hall, Hexham
Ridley, Matthew...
Ridley, T. D....Chelmsford
Ridley, Thomas...Parkend, Hexham
Rigby, Thomas...Darnhill Farm, Winsford, Cheshire
Rigden, Richard Henry ..Salisbury
Rigden, William...Hove Farm, Brighton
Rigg, Joseph...Filloughley, Coventry
Riley, Edmund...South Dalton, Beverley
Riley, Major J. E...Elm Ho., Winkfield, Windsor
†Riley, Luke...Meriden, Coventry
Rimell, Wm...Berrington Court, Campden, Glouces.
Ringer, John...West Harling, East Harling, Norfolk
Rising, Robert...Horsey, Great Yarmouth
Rising, Wm....Somerton Hall, Great Yarmouth
Risley, Rev. W. C....Deddington, Banbury
Rist, Isaac...Tattingstone, Ipswich
†River, John...
†Rivington Harry...College Farm, Cirencester
Rix, Benjamin...St. Matthew's, Ipswich
Rix, Nathaniel, jun....London Colney, St. Alban's
Roads, J....Ashmore Farm, Addington, Winslow
†Robarts, A. J....Lillingstone Dayrell, Bucks
Robbins, Harry...Northfield Farm, Witney
Roberts, Bennett S....Burton Hall, Wrexham
†Roberts, Charles G....Haslemere, Surrey
Roberts, Edward...Berden Hall, Bishop's Stortford
Roberts, Joseph...Southleigh, Truro
Roberts, Richard...Burrington, Ludlow
Roberts, Thomas Lloyd...Corfton Hall, Bromfield
Roberts, T. Bartlett...Morval, Liskeard
Roberts, Wm. Harvey...Trewhiddle, St. Austell
Roberts, W. Henry...Alms Hoe Bury, Hitchin
†Roberts, Wightwick...Trethill, Sheviock
Robertson, Wm. Rountree...Forest Hall, Ongar
Robey, Robert...Canwick Road, Lincoln
Robins, G. F....Isleham, Soham
Robinson, Alfred...Gas Works, Leicester
Robinson, Dixon...Clitheroe Castle, Clitheroe
Robinson, George...Whiston, Shiffnal
Robinson, G...Slimbridge, Stonehouse, Gloucesters.
Robinson, Jas....Bateson's Farm, Brindle, Chorley
Robinson, James Charles...Stevington, Bedford
Robinson, John...Backwell House, Bristol
Robinson, John...Gosforth, Newcastle-on-Tyne
Robinson, Col. John George...21, Montagu Sq., W.
Robinson, Sir J. Stephen, Bart...16A, Park Lane, W.
†Robinson, Joe...Clifton Pastures, Newport Pagnell
Robinson, Rowland...Fenny Drayton, Nuneaton
Robinson, Thomas...Nuthill, Hedon, Hull
Robinson, Thomas...Castle Ashby, Northampton
Robinson, William...Bone Hill, Tamworth
Robinson, William...Heatley, Lymm, Cheshire
Robotham, A...Oak Farm, Drayton Bas., Tamworth
Robson, James...Brackenborough, Louth
†Robson, John...Byness, Rochester, Northumb.
Robson, William...Wilton, Salisbury
Rocke, James John...Glastonbury
†Rodd, F....Trebartha Hall, Launceston
Roddam, J. J....Newtown, Stanhope, Darlington
Rodgers, Herbert...Gilmorton, Lutterworth
Rodgett, Miles...Sandford, Wareham, Dorset
Rodwell, B. B. H...Ampton Hall, Bury St. Edmd's.
Roe, Rev. Charles...Sicclesmere, Bury St. Edmund's
†Roebuck, J. A., M.P....19, Ashley Place, S.W.
Rogers, John...The Hill, Chellington, Bedford
†Rogers, John J....Penrose, Helston
†Rolfe, C. Fawcett Neville...Sedgeford Hall, Lynn
Rolfe, James...Bury St. Edmund's
Rolls, John E. W....The Hendre, Monmouth
Rolt, Lord Justice...Ozleworth Park, Gloucester
Romilly, Edward...Porthkerry, Cardiff
Romney, Earl of...The Mote, Maidstone
Rooke, John...Weldon Grange, Wansford
†Rooper, George...Nascott House, Watford

†Rooper, J. Bonsey...Abbotts Ripton, Hunts
Root, William...Chipping Warden, Banbury
Roper, S. Craske...Rougham Pl., Bury St. Edmund's
Roper, William...Ling, Sebergham, Cumberland
Rose, Christopher...Zeals Green, Mere, Wiltshire
Rose, Philip...Rayners, High Wycombe, Bucks
Rosewarne, John...Nanspusker, Hayle, Cornwall
Rosling, Edward...Droxford, Southampton
†Ross, James...Hoo Park Farm, Luton
Rosslyn, Earl of...Easton Lodge, Dunmow
†Rothwell, R. R....Sharples Hall, Bolton, Lancashire
Rotton, Richard...3, Boltons, Brompton, S.W.
Rous, Hon. Wm. Rufus...Worstead House, Norwich
†Rouse-Boughton, Sir C. H., Bt...Downton Hall, Ludl.
Row, E. T....Moulds Haugh, Northumberland
Rowell, H...Coally Hill, Walbottle, Newcastle-on-T.
Rowland, John...Hollybank, Wootton, Woodstock
†Rowland, Richard...Creslow, Aylesbury
Rowlandson, Christopher...The College, Durham
Rowlandson, Samuel...The College, Durham
†Rowlandson, Samuel..Newton Morrell, Darlington
Rowley, George W....Priory Hill, St. Neot's
Rowley, John Geo....Rockstowes House, Dursley
Rowley, Hon. R. T...Rhyderddwyn Faur, Rhuddlan
†Royds, Albert Hudson...Falinge, Rochdale
†Royds, Henry...Wavertree, Liverpool
†Royds, Rev. John...Heysham Rectory, Lancaster
†Royston, Viscount, M.P...Wimpole, Cambridgesh.
Ruck, Edmund...Castle Hill, Cricklade
Ruck, L....Pantlludw, Machynlleth, North Wales
Rucker, Martin D....Woodside, Sydenham, S.E.
Rudwick, Fred. F....Donnington, Chichester
Rudyerd, Henry...Iver, Uxbridge
Ruffle, John...Norbiton Common, S.W.
Rumbold, C. J. A....5, Percival Terrace, Brighton
Ruse, Robertson...Warfield, Bracknell, Berks
†Russell, Lord C. J. F....Drakeloe Lodge, Woburn
Russell, Sir Chas., Bt., M.P...Swallowfield, Reading
Russell, David...Clifton Lodge, York
Russell, James...Brimstage Hall, Birkenhead
Russell, John...Terhill House, Cheltenham
†Russell, Robert...Pilmuir, Leven, Fife
Russell, Robert...Horton Kirby, Dartford
†Russell, Sir W., Bt., M.P...Charlton Pk., Cheltenham
Rust, Edward...
Rust, James...Alconbury House, Huntingdon
Rust, Wm. Holyoake...Good Easter, Chelmsford
Ruston, A. S....Aylesby Ho., Chatteris, Isle of Ely
Ruston, Joseph...Lincoln
Rutherford, Thomas...Hothfield, Ashford, Kent
Rutzen, Baron F. de...Slebech Hall, Haverfordwest
†Ryder, Hon. G. D....Westbrook, Hemel Hempsted
Ryder, Thomas B....57A, Church Street, Liverpool
Ryland, T....Gt. Lister Street Works, Birmingham

S.

Sabin, John...Harbury, Southam, Warwickshire
Sadler, Henry...Mid-Lavant, Chichester
Sadler, R. Stebbing...Park Farm, Bolney, Cuckfield
Sadler, Thomas...Chiddingfold, Surrey
Sadler, Wm....Ferry Gate, Drem, North Britain
Sainsbury, W....Hunts Ho., W. Lavington, Devizes
†St. Alban's, Duke of...Redbourn Hall, Brigg
†St. John, Hon. B. M..Melchbourne, Higham Ferrers
†St. Leger, Major John...Park Hill, Rotherham
†St. Maur, Lord Archibald...Burton, Loughborough
†Salkeld, Thomas...Holme Hill, Carlisle
Sallit, Matthew...Saxlingham, Norwich
Salomons, David, M.P....Broom Hill, Tonbridge
Salt, Herbert...Methley Park, Leeds
Salt, Thomas...Weeping Cross, Stafford
Salt, Titus...Methley Park, Leeds
†Salt, Wm. Henry...Kirby Frith, Leicester
Salter, W. P....The Abbey, Thetford
Saltmarshe, Philip...Saltmarshe, Howden
†Salvin, M. C...Sarnsfield Court, Kington, Hereford
Samman, John...Middleton Stoney, Bicester
Samman, Wm....Middleton Park, Bicester
Sample, Thomas...Matfen Newcastle-on-Tyne
Sampson, S....Broadway Kelly, Winkleigh, Devon
Sampson, Thomas...Moor Hall, Ninfield, Battle
Samuelson, B., M.P..Britannia Iron Works, Banbury
Sanday, George Henry...Holme-Pierrepont, Notts
Sanday, W....Holme-Pierrepont, Notts
†Sandbach, H. R. ..Hafodunos, Llanrwst, Denbigh.
Sanders, E. A....Stoke House, Exeter
Sanderson, James...10A, Pall Mall East, S.W.
Sanderson, R. B., jun...N. Jesmond, Newc.-on-Tyne
†Sandford, G. M. W., M.P....33, Hertford Street, W.
†Sandford, Mark...Martin, Dover
Sandle, Wm....Park Hall, Gt. Bardfield, Braintree
Sandwich, Earl of...Hinchingbrooke House, Hunts.
Sarson, John...Welford Place, Leicester
†Satterfield, Joshua...Alderley Edge, Manchester
†Saunders, Charles R....Nunwick Hall, Penrith
Saunders, James...St. Paul's, Clapham, S.
Saunders, Randle Wm....Nunwick Hall, Penrith
†Saunders, Thos. B....Priory, Bradford-on-Avon
Saunders, T. H....Watercombe, Dorchester, Dorset
†Saunders, William Wilson...Hillfield, Reigate
Savage, Saul P..Leys Farm, Wootton-under-Edge
Savidge, Mat....The Lodge Farm, Chipping Norton
†Savignon, Don D....Mexico
Savill, John...Orange Hall, Gosfield, Halstead
Savory, James...Tewkesbury
Savory, Paul Haines...Gloucester
Sawyer, Charles...Heywood Lodge, Maidenhead
Say, R. Hall...Oakley Court, Windsor
Sayers, John...Field Dalling, Holt, Thetford
Scarbrough, J. L...Stafford Ho., Colyford, Axminster
Scarsdale, Lord...Kedleston Hall, Derby
Scarth, Jonathan...Shrewsbury
Scarth, Matthew...
Scarth, Thos. Freshfield...Keverstone, Darlington
Scarth, William Thomas...Keverstone, Darlington
Scawin, Thomas...19, Market Place, Durham
Schneider, H. W....Lightburn House, Ulverston
Schollick, E. Jones...Aldingham Hall, Ulverston
†Schwann, F. S...N. Houghton Manor, Stockbridge
Scott, Col. Hon. C. Grantham...79, Eaton Sq., S.W.
Scott, C. S...The Hill, Thorpe Moneux, Bildestone
Scott, Jas. Winter...Rotherfield Park, Alton, Hants
Scott, Joseph...Colney Hall, Norwich

Scott, Joseph..11, Victoria Ter., Newcastle-on-Tyne
Scott, J. Stearn...Lavenham Hall, Sudbury, Suffolk
Scott, Thomas...Gt. Barton, Bury St. Edmund's
Scott, T. C.... 19, King's Arms Yard, Moorgate St.
Scott, Thomas Edward...Crondall, Farnham, Surrey
Scott, William...Normanton Turville, Hinckley
†Scott, Wm. C....Thorpe, Chertsey
Scragg, Thomas...Calveley, Tarporley
†Scragg, William...Great Clacton, Colchester
†Scratton, D. R....Prittlewell Priory, Rochford
†Scriven, E...Wormleighton Hill, Leamington
Scriven, George...Castle Ashby, Northampton
Scudamore, John...Pengethley Court, Ross
Scudamore, Lt.-Col....Kentchurch Court, Hereford
Seager, James Lys...Carroun House, S. Lambeth, S.
Seal, Charles Wm....Herriard Grange, Basingstoke
Searle, Malcolm...2, Bond Court, Walbrook, E.C.
Searson, R....Cranmore Lodge, Market Deeping
Seawell, Thos. Aug....Marelands, Farnham, Surrey
†Sebright, Sir J. G. S., Bt...Beechwood, Dunstable
†Sedgwick, Professor...Trinity College, Cambridge
Seels, Henry John...Wainfleet Hall, Lincolnshire
Selmes, James...Tufton Pl., Northiam, Staplehurst
Senhouse, Capt. Wm....Ashby St. Ledgers, Rugby
Seppings, T. Johnson...South Creake, Fakenham
†Severn, J. P...Penybont Hall, Penybont, Radnorsh.
Sewell, Daniel...Beaumont Hall, Colchester
Sexton, George...Wherstead, Ipswich
†Sexton, G. Mumford...Wherstead Hall, Ipswich
†Seymour, Rev. Sir J. H. C....Berkhampstead
Shackel, George...Erleigh Court, Reading
Shackle, Thomas...Hayes, Uxbridge
Shaftesbury, Earl of...St. Giles', Cranbourne
Shafto, T. D....CheveneyHouse, Hunton, Maidstone
Shann, Charles...Inholes, Tadcaster
Sharman, S....Home Farm, Little Crosby, Liverpl.
†Sharman, Warren...Melton Mowbray
Sharp Granville...Cardew Lodge, Carlisle
Sharp, Isaac...Middlesborough-on-Tees
Sharp, William...Shottesbrook, Maidenhead
Sharpe, Robert...
Sharpe, William...Mavis Enderby, Spilsby
Sharpe, W. Barling..Baker's Cross, Cranbrook, Kent
Shaw, Chas. H...Woodbine Cottage, Hackney, N.E.
Shaw, Geo., M.D....Leicester
Shaw, Rev. G. E. F...Edgeworth Rectory, Cirences.
Shaw, H. Geo....The Hollies, Wilmslow, Cheshire
†Shaw, John...Beddington Lodge, Croydon, S.
Shaw, Rev. M....Rougham Rectory, Bury St. Edm.
†Shawe, R. F....Lotherton Hall, S. Milford, Yorks.
Sheffield, Earl of...Sheffield Park, Uckfield
Sheffield, Sir R., Bt....Normanby, Brigg, Lincolns.
†Sheild, W. H....Lampeter Valley, Narberth
†Sheldon, H. J....Brailes House, Shipston-on-Stour
†Sheldon, Jonathan...Eynsham, Oxford
Shellabear, Samuel...Holkham, Wells, Norfolk
Shepheard, Joseph...Torpoint, Cornwall
Shepherd, E. H...Bovington Farm, Wool, Wareham
Sheppard, J. G....Campsey Ashe, Wickham Market
Shepperson, Thomas...Lenton, Notts
†Sherard, Lord Philip C....Glatton, Stilton, Hunts
Sheraton, William...Broom House, Ellesmere
Sherborn, Francis...Bedfont, Hounslow, W.
Sherbrooke, H. Porter...Oxton, Southwell, Notts
Sheridan, R. B., M.P....Frampton Court, Dorchester
Sherriff, Alexander C., M.P....Worcester
Shield, J., jun..Casington Grange, Belford, Northum.
Shiell, John...Kenton, Newcastle-on-Tyne
†Shillingford, George Wm....Eynsham, Oxford
Shingler, J. H....Birch Hall, Ellesmere
Shipman, Robert M....Beedbury, Stockport
Shipman, Thomas...Croxton Lodge, Grantham
Shipperdson, Rev. E. H...Hermitage, Chester-le-St.
Shipway, Wm....Hanley Castle, Upton-on-Severn
Shirley, Thos...Pond Cross Farm, Newport, Essex
†Shrubb, John Lane...Rodlease, Lymington
†Shuter, James...Crookham, Newbury
†Shuttleworth, Joseph...Hartsholme Hall, Lincoln
Sibley, Robert...Annable's Farm, Luton
Sidley, Chas. Morton...1, Welford Place, Leicester
Sidney, S...St. Alban's Cot., Northend, Fulham, S.W.
Sikes, John...Sudbury, Suffolk
†Sills, William...Casthorpe, Grantham
Silvester, Fran. Rob....Hedges Farm, St. Alban's
Simcoe, Rev. H. A....Penheale, Launceston
Simeon, Sir J., Bt., M.P....Swainston, Isle of Wight
†Simes, Nathaniel P....Stood Park, Horsham
Simon, James...Greenfield, Holywell, Flintshire
Simonds, Henry Adolphus...Reading Iron Works
†Simonds, J. Cabourne...Fishtoft, Boston
†Simonds, Thomas...41, West Smithfield, E.C.
Simonds, W. B., M.P...Abbott's Barton, Winchester
Simpkin, Benjamin...Hoby, Leicestershire
Simpkin, Thomas H....Hoby, Leicestershire
Simpson, A...Westmorland Mills, Chiswell St., E.C.
Simpson, Benjamin Soulby...Boston
Simpson, H. Bridgman...Babworth, Retford, Notts
Simpson, John...Pyle Hotel, Bridgend
Simpson, John...Potterspury, Stoney Stratford
Simpson, John Thomas...Boughton, Ollerton
Simpson, Joseph...Spofforth Park, Weatherby
†Simpson, Pinder...29, Saville Row, W.
Simpson, Rich....Haggerstone, Beal, Northumb.
Simpson, S. W....North Laiths, Rufford, Ollerton
Simpson, W. T....Old Buckenham, Attleboro'
Sims, Reuben...Grove House, Moor Park, Preston
Sims, W. Dyllwyn...Ipswich
Sinclair, John...Glenurquhach, Inverness
Sing, Henry...Swancote, Bridgnorth
Sing, William...Newton, Bridgnorth
†Sisson, Robert James...Talardy, St. Asaph
Sitwell, Rev. H. W....Stainsby House, Derby
Sitwell, Robert Sacheverill...Merley, Derby
Skead, J....Calder Farm, Calder Bridge, Whitehvn.
Skelton, W...Sutton Bridge, Long Sutton, Lincolnsh.
Sketchley, William...Gt. George Street, Weymouth
Skillicorne, William Nash...Cheltenham
Skipworth, G. B....Moorton House, Caistor
Skirving, William...15, Queen Square, Liverpool
Skrine, Henry Duncan...Warleigh Manor, Bath
†Slade, A. F....Kemmal House, Chiselhurst
†Sladen, Charles...Geelong, Victoria, Australia
Sladen, Douglas B....2, King's Arms Yard, E.C.
Sladen, Joseph...Hartsbourne Manor, Watford
Sladen, St. Barbe...14, Parliament Street, S.W.
Slater, Cyrus...Dunkirk, Holmes Chapel

Slater, Martin...Cheveley Hall, Newmarket
Slator, Thomas...Market Place, Boston
Slee, Henry W....Leicester
Slye, Wm. Walter...Beaumont Castle, Lancaster
Smallbones, G. B....Sternickel & Lentenis, Vienna
Smallpiece, Job...Compton, Guildford
Smart, Major George John...Tumby, Boston
Smart, William Lynn...Linden, Woburn
Smedley, C. E. B....Shottle House, Belper
Smijth, Sir William Bowyer, Bt....Hill Hall, Epping
†Smith, Abel...Woodhall Park, Hertford
Smith, Alexander M....Kent Street, Liverpool
Smith, A. M....Cop House, Chester
†Smith, A....Tresco Abbey, Isles of Scilly, Cornwl.
Smith, Charles...Kent Street, Liverpool
†Smith Charles...Dunchurch Hall, Rugby
†Smith, Sir Chas. C. W., Bt....Suttons, Romford, E.
†Smith, C. R....Filkin's Hall, Lechlade
Smith, D., jun....Martley Hall, Wickham Market
†Smith, Edwards...Ratcliffe-on-Trent
†Smith, Edward James...14, Whitehall Place, S.W.
†Smith, George...The Laham, Penrith
Smith, George Robert...Selsdon Park, Croydon
Smith, H....The Grove, Cropwell, Bingham, Notts
Smith, Henry...Eshe Hall, Durham
Smith, Hen...New House, Sutton Maddock, Shiffnal
Smith, Henry...Brierly Hill
Smith, Henry Abel...Welford, Nottingham
Smith, Henry Trefusis...Devonport
Smith, James...Little Moyle, Carlow, Ireland
Smith, J. A....Bradford Peverell, Dorchester
†Smith, J. Heseltine..10, Highbury Pl., Islington, N.
†Smith, J. Metcalf...Leeds
†Smith, John...
Smith, John...Althrey, Wrexham
Smith, John...Breeder Hill, Grantham
Smith, John...Marton Lodge, Bridlington
Smith, John...The Abbey, Romsey, Hants
Smith, John...Deeping High Bank, Crowland
Smith John F....Glemsford Hill, Sudbury
Smith, John P....Hereford
Smith, John Philips...Lower Wick, Worcester
Smith, J. T...Beauchamp Grange, Kibworth, Leices.
Smith, Joseph...Henley-in-Arden
Smith, Joseph Lambourne...Ledbury
Smith, Martin T...13, Upper Belgrave Street, S.W.
Smith, Percy L....Gt. Peating Lodge, Lutterworth
Smith, Richard Booth..Huxley Farm, Edmonton, N.
Smith, Richard S....Broad Hinton, Swindon
†Smith, Robert...Goldings, Hertford
Smith, Robert..Harford House, Chew Magna, Bristol
Smith, Robert Barclay...Tynewydd, Bangor
Smith, Robert Thursfield...Whitchurch, Salop
Smith, Rev. Roger...Plymouth
Smith, Thomas...Mollington Farm, Chester
Smith, Thomas Robert...Shareshill, Wolverhampton
Smith, Tysoe...Hinchwick Farm, Stow-on-the-Wold
†Smith, Sir Wm., Bt....
Smith, William...Chimbams, Farningham, Dartford
†Smith, William...Winchcomb, Gloucestershire
†Smith, William...Bibury, Fairford
Smith, William...Garthorpe, Goole, Yorkshire
Smith, William...Kettering
Smith, William...Littlehales, Newport, Salop
Smith, William...High Hoopern, Exeter
†Smith, W. B....Stoneleigh Villa, Leamington
Smith, William J....Monkland, Leominster
Smith, William W....Colwood Park, Cuckfield
Smithers, William...Quarry, Bletchingley, Surrey
Smithin, Benjamin...Sheriff's Leuch, Evesham
Smithin, Joseph...Wadborough, Kempsey, Worcest.
Smithson, Geo....47, Smallbrook St., Birmingham
Smyth, James...Peasenhall, Witham
†Smyth, John George...Heath Hall, Wakefield
Smyth, William...Little Houghton, Northampton
Smyth, Rev. William...Elkington Hall, Louth
Smyth, Sir C F., Bt....Acton Burnell, Shrewsbury
†Smythies, Carleton...
†Smythies, George...Leintwardine, Salop
Sneezum, Thomas...Preston, Middlesex, N.W.
†Snell, John F...Great Bardfield Lodge, Braintree
Snewing, Charles...Holywell Farm, Watford
Snow, Cyprian...Manor Farm, Dunston, Sleaford
Snow, James M....Metheringham, Sleaford
†Snowball, F. J...Seaton Burn House, Cramlington
Snowball, William...Monkton, Gateshead
Soames, D. W....Harrow Weald, Stanmore, N.W.
Solly, George Bushell...Monkton Court, Ramsgate
Somersett, John...Milton, Pewsey, Wilts
†Somerville, J. C....Dinder Ho., Wells, Somerset
Souley, W....Kirby Moorside, Yorkshire
†Southall, Thomas, Worcester
Southgate, Walter...Ipswich
Sowerby, Francis...Aylesby, Great Grimsby
Spanton, Robert...Swaffham
Spark, William...Shilton House, Coventry
†Sparks, William...Crewkerne
Sparrow, Benj....1, Caer Baddeu Ter., Plymouth
Speakman, Thomas...Doddington Park, Nantwich
Spearing, J. B....Beenham Lodge, Reading
Spearing, William...Kennett, Marlborough
Spence, John F....Chirton Cottage, North Shields
Spencer, Earl, K.G....Althorp, Northampton
†Spencer, E....Bircher, Leominster
Spencer, Francis...Claybrooke, Lutterworth
Spencer, John, jun...Whorlton Hall, Newc.-on-Tyne
Spencer, John...Bowood, Calne
†Spencer, J. W., jun...Whorlton Hall, Newc.-on-T.
†Spencer, M....Millfield House, Blaydon-on-Tyne
Spencer, Samuel...Snarestone, Ashby-de-la-Zouch
†Spencer, Thomas...Ryton, Newcastle-on-Tyne
†Spicer, J. W. Gooch...35, Belgrave Square, S.W.
Spinks, Abraham...West Bilney, Lynn
Spooner, Prof. C....Roy. Veter. College, St. Pancras
Spooner, William Charles...Eling, Southampton
Spraggon, Benjamin..Nafferton, Stocksfield-on-Tyne
Squarey, Elias P....Odstock, Salisbury
Squire, Edward Frederick...Cross Hall, St. Neot's
Squire, William...5, Coleman Street, E.C.
Stable, Robert Scott...The Park, Wanstead, N.E.
†Stables, W. A...Cawdor Castle, Nairnshire, N.B.
Stafford, Thomas...Marnham, Newark, Notts
Stainton, John...Dalby, Spilsby
†Stallard, John...Worcester
Stallard, Josiah...Worcester
Stallard, William...Brockhampton, Ross

Stamford & Warrington, Earl of.. Enville Ho., Stour.
Stamper, Thos.... Highfield Ho., Oswaldkirk, York
†Standish, W. Standish... Duxbury Park, Chorley
Stane, John Bramston... Forest Hall, Ongar
Stanford, Walter... Parham, Storrington, Sussex
Stanford, W., jun.... Steyning Court Farm, Steyning
†Stanhope, J. B., M.P.... Revesby Abbey, Boston
Stanier, J. E.... Uppington, Wellington, Salop
†Staniforth, Rev. Thos.... Storr's Hall, Windermere
Stanley, Edward... 14, Grosvenor Square, W.
Stanley, E.... The Height, Newton-in-Cartmel
†Stanley, Lord, M.P.... Knowsley, Prescot
Stanley, Henry... Upton, Shiffnal
Stanley, H.... Fornham St. Martin's, Bury St. Ed.
Stanley, W. H. S., jun.... 21, Curzon St., May Fair, W.
Stansfeld, W. R. C... Frimley Pk., Farnboro' Station
Stanton, Henry... 79, Coleman Street, E.C.
†Stapylton, Major H. M... Myton Hall, Borobridge
Stark, Michael J.... Duke's Palace Bridge, Norwich
Stark, W. P. Wilkinson... Knaptoft Hall, Rugby
†Starkey, J. Bayntun... Spye Park, Chippenham
Starkey, Major L. C.... Wrenbury Hall, Nantwich
Starmer, Chas.... Handleby, Spilsby
Statter, Thomas... Knowsley Hall, Bury, Lancashire
Staveley, John... Dotterill Park, Driffield
Stawell, Col. Alcock.. Kilbrittain, Bandon, Cork
Stearn, Samuel G.... Brandeston, Wickham Market
Stebbing, Henry... Stow Bedon Hall, Attleboro'
†Stedman, James... Lucton, Leominster
Stedman, Robert... Pakenham, Bury St. Edmund's
Stedman, Wm.... Bucknell House, Shrewsbury
Steedman, George... Hall Green, Birmingham
Steedman, Joseph... Meriden, Coventry
Steere, Lee... Jayes Park, Dorking, Surrey
Stenning, Edward... Stratton House, Godstone
Stenning, William... Halsford, East Grinstead
Stephens, E.... Trewornan, Wadebridge, Cornwall
Stephens, Rev. Ferd. T.... St. Mawgan, Cornwall
Stephens, George... Fladbury, Pershore
Stephens, J.... 7, Westbourne Cres., Hyde Park Gar.
†Stephens, Robert... 13, Paragon, Bath
Stephens, Samuel H.... Commercial Street, N.E.
Stephenson, Chris.... Park Farm Office, Woburn
Stephenson, Hugh.. Throckley Ho., Newc.-on-Tyne
Stephenson, Marshall... Fourstones, Hexham
Sterriker, John... Driffield
Stevens, J. Curzon Moore... Winscott, Torrington
†Stevens, Rev. T.... Bradfield Rectory, Reading
Stevens, William Carr... 33, Mark Lane, E.C.
†Stevenson, Capt. C. B.... Hennor House, Leominster
Stevenson, T. T.... Byker, Newcastle-on-Tyne
Steward, A. Benn... Chapel House, Whitehaven
†Steward, Chas.... Blundeston, Lowestoft
Steward, Wm.... Lambton, Fence Houses
†Stewart, Alex. J. R.. Ards House, Donegal, Ireland
Stewart, Andrew... 12, St Mary's Ter., Newc.-on-T.
Stewart, Arthur... Saint Bridge House, Gloucester
Stickney, William... Ridgmont, Burstwick, Hull
Stiles, Stephen... Wootton, Basingstoke
Still, Henry... Chelsham, Croydon, S.
†Stilwell, Arthur F.... Shepherdswell, Dover
†Stilwell, J. J. R.... Killinghurst, Haslemere
†Stirling-Maxwell, Sir W., Bt., Keir House, Perthsh.
Stirling, Sir W., Bt.... Burrs Wood, Tunbridge Wells
Stocker, J. P.... 93, Oxford Terrace, W.
Stone, Edward B... Chipchase Mill, Wark, Northum.
Stone, J. J... Ashton Vil., Upper Lewisham Rd., S.E.
Stone, John S.... Newport, Monmouthshire
Stone, J. Chamberlain... Rowleyfields, Leicester
Stone, N. Chamberlain... Ayleston Hall, Leicester
Stone, Samuel... Elmfield House, Leicester
Stone, Samuel... Eldon House, Leicester
†Stoneham, Frederick... Crayford
Stonehewer, W. S., jun... Adur Lodge, Old Shoreham
Stopford, W. Bruce... Drayton House, Thrapstone
Storer, C., M.D.... Lowdham Grange, Nottingham
Storer, Rev. John... Hellidon, Daventry
†Storrar, Robert... Grittleton, Chippenham
Story, J. B.... Lockington Hall, Derby
Stott, Mrs. Susannah G.... Eccleshill Hall, Leeds
Stowell, William Stow, jun.... Darlington
†Stowey, Augustus... Kenbury House, Exeter
†Stracey, Sir H. J., Bt.... Rackheath Hall, Norwich
Strachan, J. M.... Teddington Grove, S.W.
†Strafford, Earl of... 5, St. James's Square
Strafford, Henry... 13, Euston Square, N.W.
Straker, Henry... Riding Mill, Northumberland
Strangway, Henry Bull... Shapwick, Bath
†Stratford, H. S... Thorpe Lubenham, Market Harbo.
†Strathallan, Visc... Strathallan Castle, Auchterarder
Straton, Rev. G. W.... Aylestone, Leicester
Stratton, George... Spinnymoor House, Durham
†Stratton, J. L... Turveston Ho., Brackley, Northam.
†Stratton, R., jun.... The Duffryn, Newport, Mon.
Stratton, Richard... Stapleton, Bristol
Stratton, William... Kingston Deverill, Warminster
Strelly, Richard Clayton... Oakerthorpe, Alfreton
Streeter, William... Sandersteed, Croydon, S.
†Strickland, Chas. William... Boynton, Bridlington
Strickland, Walter... Cokethorpe Park, Witney
Strode, Geo. S.... Newnham Park, Plympton, Devon
†Strutt, The Hon. Arthur... Duffield, Derby
†Strutt, The Hon. Frederick... Kingston, Derby
†Stuart, Lt.-Col. Wm., M.P.... Kempston, Bedford
Stubbs, Chas.... Preston Hill, Penkridge
Stubbs, John... Weston Hall, Stafford
Stubbs, William... Rickerscote, Stafford
Stuckey, H.... Cothelstone, Bp.'s Lydeard, Taunton
Sturge, Charles... Crundels Farm, Bewdley
Sturgeon, Chas... South Ockenden Hall, Romford, E.
Sturgeon, Joseph... Norton Hall, Woolpit
Sturgess, Thomas... Penshurst, Tunbridge
Sturt, Henry Gerard, M.P.... Critchill, Wimborne
Stutfield, W.... 135, Harley Street, W.
Stutter, Cawston... Kilus Farm, Woolpit
Stutter, J... Oak Lodge, Queen's Road, Clapham, S.
Suffolk, Earl of... Charlton, Malmesbury
Suffield, Lord... Gunton Park, Norwich
Sumner, Rev. C. V. H.... The Paddock, Swaffham
Summers, Thomas, jun.... Cowgreaves, Shiffnal
Summerfield, Joseph... Green Barn, Lichfield
Surman, J. Surman... Swindon Hall, Cheltenham
†Surtees, Henry Edward, M.P.... Dane End, Ware
Surtees, V. C. V., M.P... Benridge Ho., Newc.-on-T.
†Surtees, Wm. Edward... Tainfield Ho., Taunton
Sutcliffe, Rev. Thomas... Royds Ho., Heptonstall

†Sutton, M. Hope...Cintra Lodge, Reading
Suttle, W. Benoni...50, Princess Street, Manchester
†Sverdrup, Thorwald...Fredericksvaern, Norway
Swan, Joseph...High House, Morpeth
Swan, Mark...Lesbury, Bilton
Swan, W. R....Wall's End, Newcastle-on-Tyne
Swann, John...Bedlington, Morpeth
Swann, John...Odstone Hill, Atherstone
Swann, William...Bedlington, Morpeth
†Swanwick, R....R. A. College Farm, Cirencester
Sweeten, Benjamin T....Ash Grove, Penrith
†Swete, John Beaumont...
Swinburne, George...Millbeck Hall, Keswick
†Swinburne, Sir J., Bt....Capheaton, Newc.-on-T.
Swinburne, T. W....Corndean Hall, Winchcombe
Swindley, J. E., Major...Cavalry Barracks, Canterb.
Swinford, John...Sarre, Margate
Swinnerton, Robert...Weddington, Nuneaton
Sworder, H....Hallingbury Hall, Bishop's Stortford
Sworder, J....West Mill, Bury, Buntingford, Herts
Sworder, William...Tawney Hall, Romford, E.
Sydney, Viscount...3, Cleveland Square, S.W.
Sykes, Edmund...Mansfield Woodhouse, Notts
Sykes, John...Croes Howell, Rossett, Wrexham
†Symonds, Thomas Powell, jun....Pengethley, Ross
Symondson, G..Sudbury Ho., Waltham Abbey, N.
Symons, Thomas George...Mynde Park, Hereford
†Synge, Francis H...Dysart, Corofin, co. Clare

T.

†Taber, John...Herne Hill, S.
Tabley, Lord de...Tabley House, Knutsford
Tailby, W. Ward...Skeffington Hall, Leicester
Tait, Henry...Shaw Farm, Windsor
Talbot, C. R. M., M.P....Margam, Glamorganshire
†Talbot, Henry...Cockfield Hall, Sudbury
Talbot, John...Lane House, Burton, Westmoreland
Talbot de Malahide, Lord...Malahide Cas., Dublin
Talbot, Wm. Hawkshead....Southport, Lancashire
Talbot, Col. Hon. W. P....Honeybourne, Gloucester
Tamplin, R. G....Carrol Ho., Wallastone, Glouces.
Tanner, Henry...2, Claremont Pl., Clifton, Bristol
Tanner, Joseph...
†Tanner, William...Patcham, Brighton
Tanton, E....Hill Farm, Torrington, Devon
Tasker, William...Waterloo Iron Works, Andover
Tate, John...Barnhill, Acklington, Northumberland
Tate, W. J...St. Margt's., Dunham Massey, Altrinch.
Tattersall, Edm....Tattersall's, Knightsbridge, S.W.
Tatton, T. W....Wythenshawe Hall, Manchester
Taunton, William...Redlynch, Salisbury
Tavendale, Joseph...Pendley Farm, Tring
Tawney, A. R....Banbury
Tayler, Rowland...Queen Street, Colchester
Taylor, Sir Charles, Bt....Forest Lodge, Liphook
†Taylor, Chas. H....Cornill, Coldstream, N.B.
Taylor, Edward...Whitton, Leintwardine
Taylor, Francis Howard..Burntwood Hall, Barnsley
Taylor, George...Dudley, Staffordshire
†Taylor, George Edward...Oatlands, Leeds
Taylor, Henry T....Holmer House, Hereford
†Taylor, Herbert M....Hartshill, Stoke-upon-Trent
Taylor, James...Stretford Court, Leominster
Taylor, James...Gorse Lodge, Swansea
Taylor, James W....38, Chester Ter., Regent's Pk.
Taylor, John...Belgrave Gate, Leicester
†Taylor, J....Burnfoot House, Wigton, Cumberland
Taylor, John...Aston Clinton, Tring
Taylor, John...Rajhmahal, Bengal
Taylor, J., jun..Sandycroft Farm, Hawarden, Chester
Taylor, Mark...Blewbury, Wallingford
†Taylor, Richard...Langdon Court, Plymouth
Taylor, R. P....Adelaide Pl., London Bridge, E.C.
†Taylor, Sam....Eccleston Hall, Prescot, Lancashire
Taylor, S. G....Hartest, Bury St. Edmund's
†Taylor, Simon W....Erlestoke Park, Devizes
Taylor, Thomas...Hopton, Wirksworth
Taylor, Thomas...Ashton, Rowant, Tetsworth
†Taylor, Thomas...Shipton-on-Cherwell, Oxford
Taylor, T. D....Grange Farm, Bury St. Edmund's
Taylor, T. Loombe...Starston, Harleston, Norfolk
Taylor, Thomas S....Leicester Frith, Leicester
Taylor, William...Glenley, Westham, Sussex
Taylor, William...Wickham Court Farm, Bromley
Taylor, Wm....Showle Court, Stoke Edith, Hereford
Taylor, William...Groby Cottage, Leicester
Taylor, William...Thingehill Court, Hereford
Taylor, Wm. Hy....High Hatton, Shawbury, Salop
Tayton, William...Syderstone, Fakenham
†Teleki, Countess Harley..Eywood, Rington, Herefd.
†Tempest, C. Henry...Broomlands, Nantwich
Tempest, Colonel...Tong Hall, Leeds
†Templemore, Lord..Dunnoby Pk., Wexford, Ireland
Templeton, A....Glanhenwye, Glasbury, Hereford
†Templetown, Visct...Castle Upton, Belfast
Tench, John...Ludlow
Tennant, Joseph Mason...Headingley, Leeds
Tennant, John Robert...Kildwick Hall, Leeds
†Tennant, Robert...Scarcroft Lodge, Leeds
Tennant, Thomas...21, Blenheim Terrace, Leeds
Teverson, Henry...High Garrett, Braintree
Thackeray, Capt....Junior United Serv. Club, S.W.
Thackwell, John Cam...Dymock, Gloucestershire
†Thew, Edward...Lesbury House, Alnwick
Thistlethwaite, Thomas...Southwick Pk., Fareham
Thomas, Alfred John...Llanwarne, Ross
Thomas, David...Brecon
Thomas, F. H....Hereford
Thomas, George...18, Redcliff Street, Bristol
†Thomas, G. T....Ermatingen, Thurgovie, Switzerl.
Thomas, John...Bletsoe, Bedford
Thomas, L. H....Caerffynnon, Talsarna, Caernarvon
Thomas, Thomas...St. Hilary, Cowbridge
†Thomas, Rev. W. J...Llan Thomas, Hay, Herefordsh.
Thompson, Alexander...Kirknewton, Wooler
†Thompson, Andrew...Berwick-on-Tweed
Thompson, Andrew...Keele, Newcastle-under-Lyme
†Thompson, Anthony...Cross, Whitehaven
Thompson, Cuthbert...Winlaton, Blaydon-on-Tyne
Thompson, Francis...Burton-on-Trent
Thompson, Maj. F. W...Willow Lod., Finchley, N.
Thompson, George...
Thompson, George A....Kirkhouse, Milton, Carlisle

Thompson, Henry...Organsdale, Kelsall, Chester
Thompson, James...Leicester
Thompson, James...Bishop Auckland, Durham
†Thompson, John...Badminton, Chippenham
Thompson, Leonard...Sheriff Hutton Park, York
Thompson, Matt....Kirkby Stephen, Westmoreland
†Thompson, W., jun..Rose Cottage, Thorpe, Colch.
†Thompson, William...Weymouth
Thompson, Rev. William...Eshe Land, Durham
Thomson, Guy...Old Bank, Oxford
Thomson, Maj. R. T....Broomford Manor, Exbourne
Thomson, Thomas H....Southfields, Leicester
Thomson, Wm. C....Dilston Haugh, Corbridge
Thorn Charles...St. Giles Gate, Norwich
Thorn, James...Kirbythore, Penrith
†Thornes, Joseph...Green House, Ossett, Wakefield
Thornhill, George...Diddington, Huntingdon
†Thornhill, T....Riddlesworth Hall, Thetford
Thornhill, T., jun...Packenham, Bury St. Edmund's
Thornhill, Wm. Capel Clarke...Buntings, Uxbridge
†Thornhill, William P....Stanton Peak, Bakewell
Thornton, Edward...Little Pitchford, Shrewsbury
Thornton, Harry...Goldington, Bury, Bedford
†Thornton, T..Cavenham Ho., Wereham, Stoke Ferry
Thorold, Sir J. H., Bt., M.P...Syston Pk., Grantham
†Thorold, Richard...Weelsby Hall, Grimsby
†Thorp, Thomas...Alnwick
†Thorp, Ven. Archd. T..Kemerton Rect., Tewkesbury
Thorp, T. H....Boyle Place Farm, Ringmer, Lewes
Thorpe, William...Shenton, Nuneaton
Thoyts, Mortimer G....Sulhamstead House, Reading
†Throckmorton, Sir W., Bt....Buckland, Faringdon
†Thurlow, T. Lyon...Baynard Park, Guildford
†Thurnall, Henry...Royston, Herts
Thursby, Major John H...Snydale Hall, Pontefract
Thursfield, T. H....Barrow, Broseley, Salop
Thynne, Rev. A. C....Penstowe, Stratton, Cornwall
Thynne, F. Geo....11, Gt. George St., Westminster
†Tibbits, Capt. J. Borlase..Barton Seagrave, Kettering
†Tiersonnier, Alph...Chateau du Colombier, Nevers
Tiffen, Joseph...Sledmere Castle, York
†Tighe, Rt. Hon. Wm. F....Inistioge, Ireland
Tilden, John...Ifield Court, Gravesend
†Tillard, Philip...Stukeley Hall, Huntingdon
†Timbrill, Robert...Beckford, Tewkesbury
Timmis, Charles...Brick House, Stafford
Timmis, Richard...Darlington St., Wolverhampton
Timson, Rev. Edward...Tatchbury, Southampton
Tinker, Henry...Holmfirth, York
Tinkler, Robert...Penrith
†Tinne, John A....Briarley, Aigburth, Liverpool
Tinsley, Henry, jun....Gedney Hill, Wisbeach
Tipper, Benjamin C....Bristol Road, Birmingham
Tippler, Wm....Roxwell, Chelmsford
†Todd, John...Mireside, Wigton, Aspatria, Cumb.
Toder, John...South Muskham, Newark-on-Trent
†Tollemache, H. B....Jun. United Service Cl., S.W.
†Tollemache, J., M.P....Tilston Lodge, Tarporley
Tombs, John...Hatherop, Fairford
Tombs, J. King...Lanford, Lechlade
Tomkinson, William...Newcastle, Staffs.
Tomline, Col. G., M.P....1, Carlton Ho. Ter., S.W.
Tomlinson, Capt. Frederick W....Leamington
Tomlinson, Wm...Biggins House, Kirkby Lonsdale
Tompson, Edw. C. S....Dromenagh, Iver, Uxbridge
Tompson, H. Kett...Witchingham Hall, Norwich
Tompson, R. James...Iver House, Uxbridge
Tomson, James...Barnt Green, Bromsgrove
Tonge, William John...Morant's Court, Sevenoaks
†Tooke, Rev. J. T. H....Scawby Vicarage, Brigg
Toomer, G. Edw....Hoaden House, Ash, Sandwich
†Torr, William...Aylesby Manor, Great Grimsby
Torrens, Robert, M.P....Ramslade, Bracknell
Toulson, John Parker...Skipwith Hall, Selby
Tovey, Robert...Fairford
Toward, Andrew...Osborne, Isle of Wight
Towerson, John...Whitehaven
Towgood, Edward...St. Neot's
Towgood, Edward, jun....Sawston, Cambs.
Towgood, Hamer...Little Shelford, Cambs.
Townend, E....The Nook, Cullingworth, York
Townend, Thomas...Knockholt, Kent
†Townsend, Rev. C. G. G....Hatfield Peverel
Townsend, G. Barnard...The Close, Salisbury
Townsend, Hen...Rydinghurst, Cranley, Guildford
Townshend, Charles...Pulford, Chester
Townshend, Geo....Oulton Cottage, Lowestoft
Traherne, G. M....St. Hilary, Cowbridge
Travers, Peter F....Great Carlton, Louth, Linc.
Treadwell, John...Upper Winchendon, Aylesbury
Tredwell, John...Leigham Court, Streatham Hill, S.
Tréhonnais, R. F. de la...
Tremain, James...Polsue, Grampound, Cornwall
†Tremayne, John...Heligan, St. Austle
†Trench, Henry...Cangort Park, Roscrea, Ireland
Trench, W. S...Essex Castle, Carrickmacross, Ireland
Trethewy, A. H....Rhyd-y-crena, Llanrwst, N. Wales
Trethewy, Henry...Trewithen, Grampound
Trethewy, Henry, jun....Silsoe, Ampthill
Trevelyan, Sir W. C., Bt....Wallington, Newc.-on-T.
Trimmer, Charles...Alton, Hants
Trinder, Edward...Cirencester
Trinder, Thomas...Sandlin, Leigh Sinton, Malvern
Trood, Edward...Matford House, Exminster
Trotter, Theodore..Stone's Pl., Skellingthorpe, Linc.
Trotter, Thomas...Bywell, Stocksfield, Northumb.
Trotter, Wm...South Acomb, Stocksfield, Northum
Trower, Capt. E. S....Stansteadbury, Ware
†Troyte, C. A. W....Huntsham Court, Bampton
Trumper, Joseph...Lake End, Windsor
†Tryon, T....Bulwick, Wansford, Northamptonshire
†Tucher, Baron August...Nuremberg
Tuck, Rev. G. R....Blofield, Norwich
Tuck, Henry...Shirley, Ringwood
Tucker, Edwin...Frogmore Street, Abergavenny
†Tucker, Henry...Bourton Ho., Shrivenham, Berks
†Tuckett, P. D., jun....10A, Old Broad Street, E.C.
†Tudor, Geo. S....Park House, Lapley, Penkridge
†Tull, Henry...Crookham, Newbury
†Tull, Richard...Crookham, Newbury
Turk, William...Charlton Kings, Cheltenham
Turnbull, Edward...West Hartlepool
Turnbull, George...Anstead, Chat Hill
†Turnbull, John George...
†Turnbull, Rev. T. S....Blofield, Norfolk
Turner, E. R. T....St. Peter's Iron Works, Ipswich

Turner, Frederic...Nizels, near Tunbridge
Turner, Fred....St. Peter's Iron Works, Ipswich
Turner, Fred. J....Dean Castle, Kilmarnock, N.B.
†Turner, Lieut.-Col. F. Henry...Gouray, Jersey
Turner, George...Brampford Speke, Exeter
Turner, George, jun....Alexton Hall, Uppingham
†Turner, George...Barnham, Thetford
Turner, Jabez...Haddon Grange, Peterborough
Turner, J. Singer...Chyngton Farm, Seaford, Lewes
Turner, John...Englefield, Reading
Turner, John...London Road, Staines
Turner, J. H...Little Horringer Hall, Bury St. Edm.
Turner, J. J....Wharncliffe St., Newcastle-on-Tyne
Turner, Philip...The Leen, Pembridge, Herefordsh.
Turner, Thomas...Mitchfield, Ross
Turner, William...Newtown, Montgomeryshire
Turner, William, jun....Stourton, Birkenhead
†Turnor, Christopher...Stoke, Grantham
Turnor, Michael...Brereton, Rugeley
Tuson, Rich. V...R. V. College, Camden Town, N.W.
Tuxford, Jos. Shephard...Skirbeck, Boston
Tuxford, Weston...Boston
Tweddle, John...Askerton Castle. Cumberland
Twitchell, Thomas...Willington, Bedford
†Tyacke, John...Merthen, Falmouth
†Tyler, Sir Jas., Kt....Pine House, Holloway, N.
Tyler, John...Leyton, N.E.
Tyler, Rev. Roper T....Llanthrithyd, Cowbridge
†Tyringham, Wm. B...Tyringham, Newport Pagnel
Tyrwhitt, Sir H., Bt..Ashwell Thorpe Hl., Wymond.

U.

Umbers, Abraham...Weston Hall, Leamington
†Umbers, Edward...Wappenbury, Leamington
Umbers, Samuel...Wappenbury, Leamington
†Umfreville, S. C....Ingress Abbey, Greenhithe
Underhill, W. S....Newport, Salop
†Underwood, Joseph...5, Hyde Park Gardens, W.
Unsworth, John...The Thorn, Penrith
Unthank, John...Netherscales, Penrith
†Upperton, Robert...35, Steyne, Brighton
Upton, H., jun....Aldwick, Bognor
Urwick, Edward...Felton, Ludlow
†Usedom, The Baron von...Berlin
Usher, George M....Railway Street, Beverley
Usher, John...Eldon Street, Newcastle-on-Tyne

V.

Vaizey, George De Horne...Halstead
†Vaizey, John Robert...Attwoods, Halstead
†Valle, Conde Del...Vergana Gurpoisea, Spain
Vallentine, R....Burcott Lo. Fm., Leighton Buzzard
Valpy, Robert Harris...Enborne Lodge, Newbury
Vanderstegen, W. H....Cane End House, Henley
Vane, Sir Henry R., Bart....Hutton Hall, Penrith
†Vane, Rev. John...Burrington, Bristol
Varnell, G. W....Beech Ho., Belton, Gt. Yarmouth
Vaughan, John W....Velin Newidd Ho., Hereford
†Vaughan, Nash V. E....Rhesta, Neath, Glamorg.
†Vaux, Lord, of Harrowden...Highams, Bagshot
†Vavasour, Sir H. M....Manor House, Beaminster
†Veitch, Harry J....Exotic Nurseries, Chelsea, S.W.
Veitch, Jas., jun....Exotic Nurseries, Chelsea, S.W.
†Vere, John...Carlton-upon-Trent, Newark, Notts
†Verner, E. Wingfield, M.P....86, Eaton Sq., S.W.
†Verney, Sir H., Bt., M.P....Claydon House, Winslow
†Vernon, Lord...Sudbury Hall, Derby
Vernon, Hon. F. H....Laundemer House, Oundle
Vernon, G. H....Grove Hall, East Retford, Notts
Vernon, Hon. G. R...Auchan's Ho., Dundnld., Ayrsh.
†Vernon, Harry F., M.P...Hanbury Hall, Droitwich
Vernon, William...Post Office, Tarporley
Verrall, Richard Relfe...Falmer, Lewes
Vesey, Charles C....Lucan House, Lucan, Dublin
†Vevers, Charles...Ivington Park, Leominster
Viall, King...Stoke, Clare, Suffolk
Vickerman, Charles R....Thoby Priory, Brentwood
Vickers, Thomas...Polygon, Chatham Hill, Manch.
†Vickers, V....Ellerton Grange, Newport, Salop
Villar, James...Charlton Kings, Cheltenham
Villiers, Hon. F. W. C....Sulby Hall, Welford
†Vincent, James...Clifton Maybank, Yeovil
Vivian, George...11, Upper Grosvenor Street, W.
Vivian, Lord...Glynn, Bodmin
Vivian, Maj.-Gen. Sir R. J. H., Bt., K.C.B..Caterham
Voile, John...Churchover, Rugby
†Voile, Thomas...Frolesworth, Lutterworth
Voss, W. J....West Bucknowle, Corfe Castle, Dorset

W.

†Waddilove, G. M. D....Brunton House, Hexham
Waddingham, J...Guiting Grange, Winchcomb
Waddington, Edward...Kettlethorpe Hall, Newark
†Waddington, John...Langrish House, Petersfield
Wade, Henry Roe...Little Waldingfield, Sudbury
†Wade, R...58, Upper Seymour St., Portman Sq. W.
Wade, R. Craven...Clonbranie, Crossakeile, Meath
†Wadham, Edward...Mill Wool, Dalton-in-Furness
Wagner, G.H. M....77, Marina, St. Leonard's-on-Sea
†Wagstaff, Thomas...Stifford Clay's Farm, Romford
Wagstaff, Thomas...Chesterton, Peterboro'
†Wainman, W. Bradley...Carhead, Crosshills, Leeds
Waite, John N....Martham Hall, Gt. Yarmouth
Waites, John M....Gloucester
Wakefield, George...Minworth, Birmingham
Wakefield, William...Catton, Burton-on-Trent
†Wakefield, W. H....Prizet, Kendal
Walbey, Samuel...Barley, Royston
Waldy, Edward...Barmpton, Darlington
Walker, Caleb...Chillesford Lodge, Wickham Mkt.
Walker, Edward...Brynhyfryd, Dolgelley
Walker, E. C....Chester
Walker, Sir E. S., Knt....Berry Hill, Mansfield
†Walker, Frederick James...Claxton Grange, York
Walker, Frederick T....39, Harley Street, W.
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Walker, Geo. Henry...Highfield, Mayfield, Sussex
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Quantity per acre for medium soil:—	lb.	oz.
Perennial rye grass, Lolium perenne	7	8
Pacey's rye grass, Lolium paceyanum.. ..	3	8
Meadow fescue, Festuca pratensis	1	8
Hard fescue, Festuca duriuscula	2	0
Sheep's fescue, Festuca ovina	1	8
Smooth meadow grass, Poa pratensis	2	4
Crested dogstail, Cynosurus cristatus	1	12
Downy oat grass, Avena pubescens	0	12
Golden oat grass, Avena flavescens	2	4
Sweet vernal, Anthoxanthum odoratum ..	1	4
Cow grass, Trifolium pratense perenne ..	3	0
White Dutch, Trifolium repens	3	0
Trefoil, Medicago lupulina	5	0
Kidney vetch, Anthyllis vulneraria	0	4
Giant sainfoin, Onobrychis sativa, var. bifera	2	8

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Quantities per acre for medium soil:—	lb.	oz.
Birdsfoot trefoil, Lotus corniculatus	0	4
Sweet vernal, Anthoxanthum odoratum ..	1	0
Meadow foxtail, Alopecurus pratensis ..	1	8
Timothy, Phleum pratense	1	8
Smooth meadow grass, Poa pretense	1	4
Wood meadow grass, Poa nemoralis	1	4
Rough meadow grass, Poa trivialis	1	0
Cocksfoot, Dactylis glomerata	2	8
Meadow fescue, Festuca pratensis	3	0
Red fescue, Fetusca rubra	0	8
Perennial rye grass, Lolium perenne	2	0
Devon eaver, Lolium Devoniensis	10	0
Yarrow, Achillea millefolia	0	4
Cow grass, Trifolium perenne	4	8
Perennial white clover, Trifolium repens ..	4	8
Alsike, Trifolium hybridum	2	0
Kidney vetch, Anthyllis vulneraria	0	4

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- 7lb. Trefoil, Medicago lupulina.

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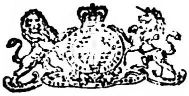

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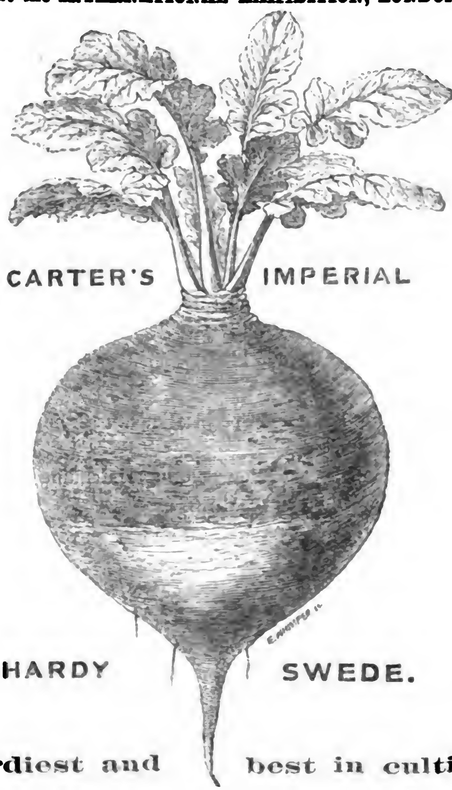

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List of Officers of the Royal Agricultural Society of England, 1868.
Standing Committees for 1868.
Report of the Council to the General Meeting, May 22, 1868.
Cash Account and Balance-sheet, from 1st Jan. to June 30, 1868.
Leicester Meeting, 1868.—Award of Prizes.

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